DL3800 DS1 Inverse Multiplexer User Guide

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The DL3800 complies with FCC Part 15 of the Federal Communications Commission (FCC) Rules concerning radio frequency emissions for Class A computing devices. The following section is required by the FCC.

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Incidence of harm: If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

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Malfunction of the equipment: In the event this equipment should fail to operate properly, disconnect the unit from the telephone line. Try using another FCC approved telephone in the same telephone jack. If the trouble does not persist and appears to be with this unit, disconnect the unit from the telephone line and discontinue use of the unit until it is repaired. Please note that the telephone company may ask that you disconnect this equipment from the telephone network until the problem has been corrected or until you're sure that the equipment is not malfunctioning.

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Preface

The DL3800 DS1 Inverse Multiplexer User Guide provides the information you need to install, test, operate, and manage the DL3800.

AUDIENCE

This guide is prepared for network managers and technicians who are responsible for the installation of LAN-to-WAN equipment, and who are thoroughly familiar with the network topology in which the DL3800 is expected to operate.

ORGANIZATION

Chapter 1, *"Quick Install Guide,"* provides a concise installation procedure for most applications.

Chapter 2, *"Introduction,"* provides a description of the DL3800 system architecture, a discussion of features and benefits, and a sample application.

Chapter 3, *"Installation,"* provides guidelines for placing and securing the DL3800 in the operation site. Use this chapter to find out about command tools, system access, and basic configuration.

Chapter 4, *"Terminal Interface,"* shows how to monitor and manage the DL3800 using a VT100 terminal.

Chapter 5, *"Front Panel Interface,"* shows how to monitor and manage the DL3800 using the front panel.

Chapter 6, *"Diagnostics"* provides guidelines for troubleshooting the DL3800.

Appendix A, *"Specifications,"* provides the electrical, physical, and networking characteristics of the DL3800.

Appendix B, *"Pinouts,"* details connector and pin assignments for the DL3800.

Appendix C, *"Factory Default Settings,"* lists factory defaults for for the DL3800.

CONVENTIONS

This section describes the conventions used to delineate specific types of information throughout Digital Link user guides.

Symbols

Symbols denote text that requires special attention. The information contained alongside a symbol corresponds to one of four levels of severity:

NOTE: Follow guidelines in this, or the previous, paragraph to use the Digital Link product more effectively.

CAUTION: Follow guidelines in this, or the previous, paragraph to avoid equipment damage or faulty application.

WARNING: Follow the instructions in this, or the previous, paragraph to avoid personal injury.

ELECTRO-STATIC DISCHARGE — CAUTION: Follow the instructions in this, or the previous, paragraph to avoid the discharge of static electricity, and subsequent damage to the equipment.

Typography

Digital Link manuals delineate the names of files, commands, and actions by using the fonts and typefaces described in the following table:

Typeface or Symbol	Purpose	Example
`Courier Font AaBbCc123`	The names of commands, files, and directories, as well as on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% You have mail.`
`Courier Font, Bold AaBbCc123`	The input you provide, as contrasted with on-screen computer output.	`machine_name% su`
	Keystrokes that you must provide to use the application.	Press **`Ctrl-L`** to refresh the screen.
Palatino Font, Italic AaBbCc123	Command-line placeholder that you replace with a real name or value.	To delete a file, type **`rm`** *filename*
	Book titles, new words or terms, or words that need to be emphasized.	Refer to Chapter 6 in the *User Guide.* These are called *class* options. You *must* be logged in as root to access this directory.
▼ Zapf Dingbats Font	Symbol that denotes a single-step procedure or task. Procedures requiring more than one task are numbered.	
Palatino Font, Bold Blue, Underscore AaBbCc123	Hyperlinks in the table of contents. When viewing the Portable Document Format (PDF) version of the user guide, you can click on one of these to jump directly to the selected subject matter.	
Palatino Font, Blue AaBbCc123 or AaBbCc123	Hyperlinks throughout general text.	
Helvetica Bold	Denotes actual markings on front or back panels.	Attach the cable to the **TERMINAL** port

DIGITAL LINK TECHNICAL SUPPORT

If you should experience difficulty with the setup and/or operation of your Digital Link equipment, the Digital Link Technical Support staff can assist you at any time.

Telephone	(408) 745-4200
FAX	(408) 745-4240
Email	support@dl.com
Internet	www.dl.com

Before you place a call for help, use the form provided at the end of this Preface to assemble the information that your technical support representative is likely to request.

RETURNING A UNIT

Use the following procedure if you need to return a unit for service or repair,

1. **Contact the Digital Link Customer Service Department at (408) 745-4200, or via e-mail at era@dl.com, or fax a request to (408) 745-4240 to obtain an ERA (Equipment Return Authorization) number.**
2. **Package the unit carefully and, before sealing the shipping carton, include any information you can provide about the problems you are currently experiencing with the unit.**
3. **Attach an address label to the shipping carton. Be sure to include the ERA number:**

Customer Service Department
Digital Link Corporation
217 Humboldt Court
Sunnyvale, CA 94089
ERA # _____

SEND US YOUR COMMENTS

Please let us know if this user guide meets your requirements.

Does the manual answer your questions?

Is the manual thorough?

Is the manual easy to use: can you find the information you need?

Is anything missing from the manual?

What would you like to see in the manual?

Digital Link Technical Publications	
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All suggestions and comments are appreciated.

DOCUMENT CHANGE RECORD

Date	Issue Rev.	Description	Pages Affected
July 1994	A	Initial Release	All
July 1994	B	Add Suppress Yellow, Misc. Changes	25-27All
Sept. 1994	C	FCC Requirements	iv
July. 1994	D	Update	All
December 1995	E	Update & Misc. Changes	All
February 1996	F	Misc. Changes	All
March 1996	G	External Clock, Pin Assignments	94
July 1998	H	Update for SW 3.00.4	All

1 Quick Install Guide

PURPOSE

This chapter is designed to be a quick reference for the setup and configuration of the DL3800 DS1 Inverse Multiplexer (see Figure 1-1). Please note that not all configuration items will be discussed as this chapter serves to get the end user up and running only. For further explanation of all configuration items and testing capabilities, please refer to the rest of this user's guide.

The configuration items discussed in this chapter will be based on the CSU version of the DL3800, but can be easily adapted to configure DSX units as well. Recommended configurations are geared to reflect 90% of most network applications.

Figure 1-1 The DL3800 DS1 Inverse Multiplexer

CONFIGURATION

Equipment Needed

- Terminal or PC, with DE-9 port, that will emulate an ANSI VT100.
- DL3800 CSU product (various ports)100-00380-XX (Model DL3800-XX-CSUX)
- DE-9 cable (plug-socket)154-00050-01 (Model DL1081)
- DA-15(plug) to RJ-48 (plug) for T1 connections 155-00011-01 (Model DL1033)

- HSSI or 155-10082-01(HSSI) (Model DL1404-10)
- M-34 to DB-25 cables(V.35) or 155-00903-01(V.35) (Model DL1300-10)
- DC-37 to DB-25 (RS-449)155-00902-01(RS449) (Model DL1302-10)

Setup

Terminal Log on

Connect your terminal to the **COMM** port on the back of the DL3800. Before you can log into the unit, you must make sure that terminal settings match the DL3800. Defaults for the DL3800 **COMM** port: 9600 Baud rate, no parity, 8 bit word length, 2 stop bits. To log into the unit, first press **Ctrl-X** 5 times (ie, hold down control key on terminal and press **X** five times). This gives you the unit number. Now type **Ctrl-X** ***# Unit Number*** and press **Return** or **Enter**. When prompted for user name and password press **Return** twice, and the Main Menu on the DL3800 should appear. The default unit number is 0.

Terminal Configuration

Only change the configuration items listed below. Leave other options at the factory default settings. Note that to make a change you need to press the up and down arrow to highlight the item, press the **space bar** until the desired option displays, then highlight CONFIRM and press **Enter** before exiting the menu.

Unit Configuration

Select Configuration from the Main Menu. Select Unit Configuration. Set the Time and Date. Set unit number to a number other than zero. Select Confirm, then select EXIT to go back to the CONFIGURATION MENU.

DTE Configuration

Configure the DTE interface for either V.35/RS449 or HSSI. For V.35/RS449 configuration set the clock to SCTE and Normal TD/RD clock. Set the DTE loss condition for NONE. Select Confirm, then select EXIT to go back to the CONFIGURATION MENU.

Network Configuration

Set up a port for each T1 line you plan to use. Alarm should be set to REPORT. ACTIVE/RESTORE MODE should be set for Use w/auto restore. Your frame/line code normally will be ESF/B8ZS. Primary clock Xmt = Network (assuming carrier or remote unit providing timing) Primary clock RCV should be set to AUTO. Configure SER to Immediate Confirm and select EXIT. Select Exit again to return to the Main Menu.

Save Configuration

Select SAVE CONFIGURATION from the Main Menu.

You're done! If you have any questions please feel free to call Digital Link's Technical Support at (408) 745-4200

2 Introduction

System Overview

The DL3800 DS1 Inverse Multiplexer bridges the gap between T1 and T3 data services by providing T1 multiplexing of multimegabit (up to 12.224 Mbps) DTE data onto two to eight T1 circuits. The DL3800 Inverse Multiplexer is an economical solution to bandwidth intensive applications as it provides multimegabit data transport without the need for T3 circuits. The DL3800 is an ideal solution for applications such as LAN-to-LAN internetworking, bulk data transfer, video teleconferencing, and disaster recovery.

Figure 2-1 DL3800 Inverse Multiplexer

The inverse multiplexing technique employed by the DL3800 is completely transparent to the DTE application, as the multiple T1 circuits act as a single high-speed data link. The DL3800 can accept up to a 31 milliseconds differential delay between individual T1 circuits, thus providing the capability to accommodate T1 circuits from divergent paths. This is often the case with circuits being utilized from different carriers.

An excessive delay alarm will cause a T1 line to be taken out of service. If the relative delay between all the T1 lines exceeds 31 milliseconds, then the T1 lines are removed from service one port at a time until the remaining group reside within the 31 milliseconds window. The first port taken out of service will be the one that is farthest away from the average value, regardless of its relative delay value. In order to restore a T1 line, you must use the manual restore command. In order to bring a T1 line back into

service, execute the manual restore command on the remote unit first. Then execute the manual restore command on the local unit. Auto restore will not work for lines removed due to excessive delay.

The DL3800 supports either High Speed Serial Interface (HSSI) or V.35/RS449 interfaces to the DTE. Extended Superframe (ESF) or D4 framing is supported, as well as AMI or B8ZS line coding. It is compliant with both AT&T Publication 54016 and ANSI T1.403 Facility Data Link requirements. For maximum application versatility, the DL3800 is available for both DSX-1 or Channel Service Unit (CSU) operation.

The DL3800 features an automatic rate fallback in the event of a failing T1 circuit. If the performance of a T1 circuit is detected to be falling below accepted levels, the DL3800 automatically removes the T1 from service, and throttles back the DTE to a data rate corresponding to the remaining T1s. When the alarm condition on the affected T1 has been cleared, the DL3800 can automatically restore the T1 and data rate.

The user can configure, control, and monitor the DL3800 through the front panel, an ASCII terminal (locally or remotely via a modem or remotely in-band) or a Simple Network Management Protocol (SNMP) management station. The remote DL3800 can be managed in-band using overhead in all active DS1 connections as the communications path. The DL3800 features an integrated SNMP agent which supports the DS1 Management Information Base (MIB) in addition to a unit specific enterprise MIB.

A downloadable software feature of the DL3800 allows new features and functionality to be added to the unit on line (without interrupting the data) via the unit's built-in communications port, or via a selected DS1 connection.

DL3800 Functional Description

The base DL3800 configuration consists of a motherboard with two (T1) network interface connectors and the DTE connectors (HSSI and V.35/RS449). Six additional T1 network ports can be added with the addition of from one to three daughterboards, each daughterboard supporting two additional T1 ports.

The general operation of the DL3800 is explained in the following paragraphs which describe the signal flow and overhead functions.

Signal Flow

The DL3800 is configured by the user for the number of T1 signals to be used for transmission. The DL3800 will provide a smooth clock to the DTE at the data rate required for the number of T1 outputs the user has configured. For T1, this rate will be Nx1.528 Mbps for B8ZS encoding and Nx1336 Mbps for AMI, where N is the number of T1s to be used (from 1 to 8).

The transmit smooth clock PLL can use any of the incoming T1 clocks, an external clock, or internal clock as reference. The receive smooth clock will use one of the receive clocks at its source. The smooth clock VCO will be divided down to 8 kHz to be phase compared to the 8 kHz reference. The receive buffers are large enough to accommodate variations between T1 receive clocks.

The DL3800 supports one DTE interface. For data rates up to 6Mbps, the DTE interface can be HSSI or V.35/RS449 (software selectable). For data rates over 6Mbps, only the HSSI and V.35 interfaces will be supported.

Data is sent from the DTE interface to an Inverse Multiplexer (IMUX) transmit framer. A 16-bit proprietary framing pattern is defined to satisfy the requirements of inverse multiplexing communications. This frame is constructed by using one payload bit in each frame for 16 consecutive frames. For T1, the inverse multiplexing frame is the first bit after the framing bit.

From the inverse mux framer, the data is sent to all T1 framers, where the T1 framing is added, and then to the appropriate T1 network interface and out over the T1 network.

All incoming configured T1 lines, with their respective clocks, are received into a standard T1 framer. The output of the T1 framer is fed into the IMUX framer.

Data coming into the DL3800 DS1 Inverse Multiplexer is stored in *N* independent buffers, where *N* is the number of configured input channels. From these buffers, the data will be read and IMUX framing removed.

When the incoming signal is framed on the inverse mux frame, the framer will start loading its Dual Port RAM. The address to the Dual Port RAM is derived from the 16-bit inverse mux frame. The software will ask all framers to latch their Dual Port RAM addresses at the same time, and by looking at the addresses, the software can determine which network has experienced the greatest delay.

From the receive inverse mux framer, the incoming data will go to the receive multiplexer. The net that is last in time will be enabled to tell the receive multiplexer when to start unloading the Dual Port RAM to the DTE

interface. To allow for jitter and wander specifications, the read address counter will be positioned approximately three frames behind the write address for the network last in time.

T1 Port Mismatch Detection

When the IMUX T1 circuits synchronize, they use the AT&T 54016 Facility Data Link to communicate which ports (1-8) they are. Ports that are mismatched (that is, not connected to a port with the same number) identify themselves as mismatched and take themselves out of IMUX service.

Mismatched ports taken out of service are identified as mismatched by a message in the ALARMS and STATUS MENU. No event is registered for this status item in the Event History.

An IMUX T1 circuit is re-established as soon as the mismatched circuits are disconnected and re-connected properly.

This feature is only enabled when the T1 network configuration specifies FDL mode as **ATT** or **ON**.

Port number communication is done using a Digital Link proprietary message in the 54016 FDL.

Figure 2-2 is a Functional Diagram of the DL3800 showing a unit supporting four T1 lines.

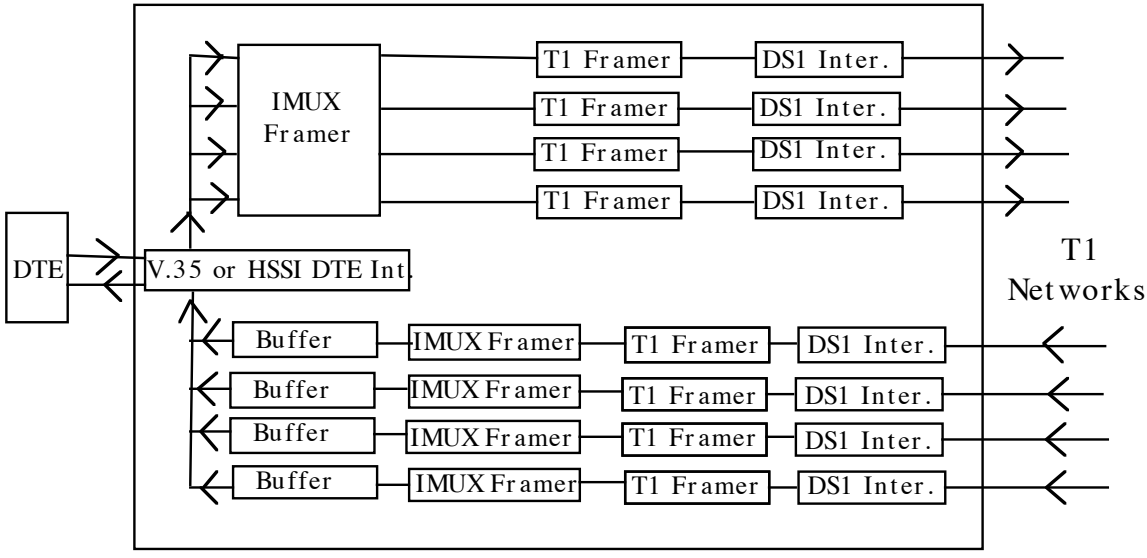


Figure 2-2 DL3800 Functional Schematic

Overhead Functions

The overhead functions consist of a controller, front panel, two RS232 communication interfaces (terminal and network management), and a power supply.

The controller function is performed by a microprocessor on the main board. The controller collects T1 statistics. It also processes T1 alarms and performance monitoring information, as well as supporting unit configuration, test and maintenance activities. Finally the Controller block supports the front panel display, terminal port, and SNMP port interfaces.

The front panel consists of a 16 character vacuum fluorescent display, 4-key keypad and LEDs. This panel can be used to provision the unit, run diagnostic tests, or gain access to performance statistics.

The serial ports are RS-232C compatible ports with one port supporting a menu driven ASCII terminal interface, and the other port providing access to the built-in SNMP agent functionality.

DL3800 System Features

- Advanced Management Capabilities

The DL3800 supports a built-in SNMP agent for ease of enterprise wide network management. Also supported is a console port with a user-friendly menu driven interface for local access or remote modem access. Console ports of co-located DL3800s can be daisy-chained together, with no additional hardware required, for single console or modem support of multiple units. In addition, the DL3800 provides a front panel display for local access when a console is not available.

- Complete Diagnostic and Maintenance Capabilities

The DL3800 provides detailed statistics on all DTE T1 performance parameters as well as internal system integrity checks. The DL3800 also provides T1 and DTE loopback capabilities for ease of maintenance. Numerous alarm conditions are reported including user selectable alarm thresholds for T1 line parameters. The DL3800 also provides alarm relay contacts for both alarm indication and alarm input. For example, the alarm input allows the user to connect any alarm (fire, burglar, etc.) to the DL3800 which will forward the alarm to the management center.

- Downloadable Software Option

The DL3800 has the ability for on-line download of new product features and functions.

DL3800 System Benefits

The numerous features of the DL3800 provide many benefits to the user:

- Reliable, full performance access to T1 networks for the widest variety of DTE products
- Enterprise wide visibility via SNMP
- Local and remote access via front panel, terminal, or telnet
- Complete maintenance and diagnostic support via exhaustive alarm, statistic and test capabilities
- Downloadable code provides for on-line upgrade to the DL3800 software for both major and minor feature enhancements

APPLICATION

The DL3800 DS1 Inverse Multiplexer is designed to transport slightly more than 12 Mbps of data over eight grouped T1 lines. The user can transport large amounts of data without having to move up to more expensive T3 transport, retaining the investment made in T1 technology and equipment. A typical application is shown in Figure 2-3.

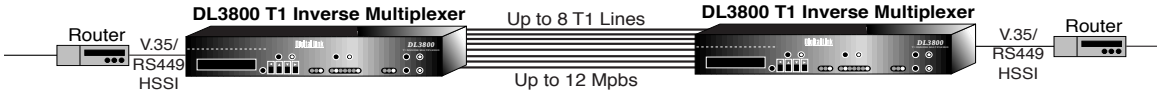


Figure 2-3 Typical Application for DL3800

3 Installation

DL3800 Installation Procedure

NOTE: Before beginning the installation process, inspect the DL3800 for damage which may have occurred during shipment. If damage has occurred, notify Digital Link and your package carrier immediately.

1. **Unpack and inspect the DL3800 for damage that might have occurred during shipment. If necessary, wipe off the exterior with a soft cloth. Save all packing slips and papers that come with the unit. Save the shipping cartons and packing materials until installation is complete and proper operation is verified.**

2. **Verify that all items ordered are included in the shipment. The shipment should consist of the following:**
   - DL3800 Digital Inverse Multiplexer
   - DL3800 Users Manual.
   - Appropriate data and network interface cables and connectors (if ordered).
   - Power cord

3. **Mount the DL3800**

   See "Mounting The DL3800" on page 3-2.

4. **Connect Power Cables and Connections**

   See "Power Cables And Connections" on page 3-3

5. **Connect network cables to DL3800**

   See "T1 Network Connection" on page 3-4

6. **Connect DTE cable to DL3800**

   See "DTE Cable And Connection" on page 3-4

7. **ASCII Terminal and SNMP Connection**

   See "ASCII Terminal and SNMP Connection" on page 3-5

8. **Configure Unit**

   See "Unit Configuration" on page 4-13 (ASCII terminal)

a. **Configure COMM PORT**

See "Unit Configuration" on page 4-13 (ASCII terminal)

b. **Configure NMS (Network Management) Port**

See "SNMP Configuration" on page 4-33 (ASCII terminal)

9. **Configure Network**

See "Network Configuration" on page 4-18 (ASCII terminal)

10. **Configure DTE**

See "DTE Configuration" on page 4-16 (ASCII terminal)

MOUNTING THE DL3800

Rack Mounting

The DL3800 is shipped with mounting ears attached to the unit ready for rack mounting onto a 19-inch rack. A 19-inch rack mounting kit is available from Digital Link.

Desk Operation And Stacking

Four stick-on rubber feet are supplied with each DL3800 DS1 Inverse Multiplexer. Remove the covering from each rubber foot, and stick them onto the bottom of the DL3800. The DL3800 units may now be stacked as required on a flat surface in a well-ventilated and secure area.

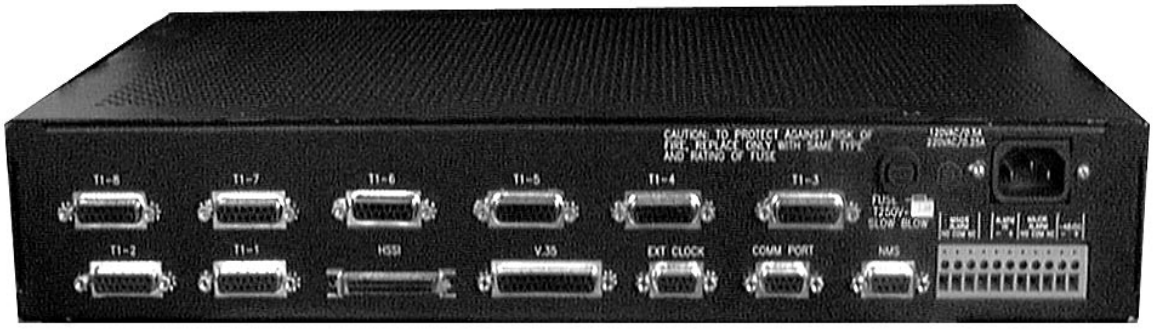


Figure 3-1 DL3800 Rear Panel

NOTE: On DC versions of the DL3800, the AC receptacle will be covered with a blank face plate.

POWER CABLES AND CONNECTIONS

AC Power Connection

An AC power cord is supplied with the DL3800 to provide 110 VAC to 240 VAC power, autoranging. The power cord receptacle is located on the rear panel of the DL3800. For AC power, connect the AC power cord to the DL3800, and plug into the nearest AC outlet.

DC Power Connection

The Digital Link DL3800 DS1 Inverse Multiplexer can also be powered by a -48 to -72 VDC power source. The DC power connection on the DL3800 is located on the back panel. There are eight screw terminals located on the rear panel. The two screw terminals on the far right (looking at the rear panel) are for DC powering.

Connect the -48 V wire to the screw terminal labeled **—**. Attach the Return (+) wire to the screw terminal to the immediate right, labeled **+**. Connect earth ground to the ground stud.

WARNING: Do not operate the DL3800 without an earth ground connection to the ground stud.

The DL3800 is designed to operate with a negative power supply. This means the positive terminal is connected to the ground.

WARNING: Damage to the DL3800 may result if power is connected improperly.

T1 Network Connection

Eight socket DA-15 connectors are located on the DL3800 back panel for connecting to the T1 networks.

WECO 728A or equivalent cable is used to connect the DL3800 to each T1 channel, using the appropriate cable and connectors, which are available from Digital Link.

DTE Cable And Connection

DTE interface connectors are provided on the back of the DL3800, a 50-pin SCSI socket receptacle for HSSI compatible DTE, and a DB-25 socket connector for V.35 or RS-449 compatible DTEs.

If using a HSSI interface, the cable connecting the DL3800 to the DTE consists of 25 twisted pairs with an overall foil/braid shield. The DL3800 end of the cable should have a plug connector. One 50-pin SCSI socket receptacle is provided on the rear of the DL3800 to connect the DL3800 to HSSI-based networks/systems. Cables and connectors are available from Digital Link. Using the appropriate cable and connectors, connect the DL3800 HSSI connector to the HSSI DTE.

If using a V.35 interface, use a shielded cable supplied by Digital Link to connect the DL3800 to the DTE. One DB-25 socket connector is provided on the back of the DL3800 to connect the DL3800 to the V.35/RS-449 compatible DTE. Using the appropriate cable and connectors, connect the V.35/RS-449 DTE device to the DL3800.

ASCII TERMINAL AND SNMP CONNECTION

The DL3800 is accessed by an ASCII terminal or SNMP Management System workstation through direct, daisy-chained, or dial-up modem connection.

On the rear panel of the DL3800, two socket DE-9 receptacles labeled **NMS** and **COMM PORT** are provided for connection to the SNMP workstation or ASCII terminal, respectively. An RS-232 straight ribbon cable with DE-9 plug connectors is used to link the DL3800 with the terminal, modem, or workstation.

Direct Connection

For direct connection, using the appropriate DE-9 ribbon-type cable, connect the ASCII terminal or SNMP workstation to the DL3800 through the Terminal or SNMP connector on the back of the rear panel. The baud rate, parity bit and stop bit settings must match those of the terminal: baud rate, 9600; eight bits, no parity and two stop bits.

Modem Connection

When using a modem, the baud rate, parity bit and stop bit settings of the modem must match the terminal or workstation port default settings: baud rate 9600; eight bits; no parity, and two stop bits. If these parameters are not the same, reconfigure the Unit default settings using the front panel controls.

When the parameters of the modem and the terminal or workstation port coincide, using the RS-232 straight ribbon cable, connect the modem to the appropriate RS-232 comm port (**COMM PORT** or **NMS**) on the rear panel of the DL3800. Then, connect the modem to the phone line and the ASCII terminal or SNMP workstation. DE-9 to DB-25 adapters and null-modem adapters are available from Digital Link. Specify a plug or socket terminal connection when ordering.

For direct connection, the terminal, workstation, or modem may be placed up to 50 feet away from the comm port when operating at 9600 baud. Distances may be increased if the baud rate is reduced.

Telnet Connection

For a telnet connection, connect a device that provides a SLIP connection to the NMS port of the DL3800. Examples include a terminal server, router auxiliary port, or the Digital Link Management Access Processor (MAP) Be

sure to provide a valid IP address to the DL3800. THere can be up to two active telnet sessions at any given time. There is no way for a user to delete the telnet session of another user.

Daisy Chaining

Multiple DL3800s can be daisy-chained together through the Terminal Port to provide centralized network monitoring and management capabilities.

A ribbon-type cable with DB-9 connectors is available from Digital Link for daisy-chaining DL3800s. The cable can be ordered to daisy-chain four units (part # 154-00051-01), eight units (part # 154- 00052-01), or twelve units (part # 154-00053-01). To place an order contact the Digital Link Sales department at (408) 745-6200.

If using a cable other than the above, see "Terminal Connection" on page B-1 for Terminal Port pin assignments. With this cable, CTS (pin 8) must be connected between DL3800s, but must not be connected to the terminal.

The one socket connector on the ribbon is to be connected to the terminal or modem (if a remote site). The remaining plug DE-9 connectors are connected to the Terminal. Each unit must be assigned a unique node number.

When units are daisy-chained together, the local terminal must be operating in Multidrop Mode. Each unit should be given a unique Node Number.

NOTE: For detailed instructions on installing SNMP systems, refer to the separate installation guides for these products.

4 Terminal Interface

LOG IN/LOG OFF

Each DL3800 is equipped with an integrated RS-232 ASCII user interface that can be accessed through the **COMM PORT** (DE-9 connector) located on the rear panel of the DL3800. Through this interface, the user can perform various functions described in this section.

When operating in multidrop mode (multiple DL3800s may be daisy-chained together for centralized network management), the user must log in to establish communication with a single unit on the network. Only one unit may be accessed at a time. All units continuously monitor the line, but only the unit which is logged on will respond to terminal commands. When no unit is logged on, the characters typed on the terminal will not show up on the display screen.

To log on and log off a particular unit, follow these procedures:

1. **Type five `Ctrl-X` commands in a row, followed by `Enter` (or `Return`) to return a "roll call" of all Node Numbers on the chain.**

   This feature is useful when the Node Numbers of any units on the network are unknown.

2. **Type `Ctrl-X` followed by #, the node number, and press `Enter` (or `Return`).**

   These characters will not be displayed on the terminal screen, but the units will receive them.

   If passwords are enabled for the unit, you will be prompted for username and password. Initially, no password or username is needed, so simply press **`Enter`** when prompted for a username or password.

3. **The Main Menu will appear. If not, check that the Node Number matches what is typed on the terminal.**

   If it still does not appear, check that the DL3800 port settings match the settings (baud rate, parity, data bits, and stop bits) of the terminal. If so, a null modem adapter may be required to interchange pins 2 and 3 (transmit and receive) from the terminal.

4. **To log on to another DL3800 on the same daisy chain, simply type `Ctrl-X`, followed by a # and the Node Number and press `Enter`.**

   The previous unit is logged out, and the new unit is logged on.

5. **To log off all units without logging onto any new units, press `Ctrl-X` at the Main Menu.**

TERMINAL OPERATION OVERVIEW

General Menu Flow

The menu interface for the DL3800 consists of the Main Menu, and a series of Sub-Menus.

From the Main Menu, select the Sub-Menu to be selected or function to be performed by moving the highlight bar through the menu screen with the Cursor Arrow keys until the desired function is highlighted.

To prevent any accidental data and/or status change, every proposed change requires a confirmation response. To confirm a proposed change, move the highlight bar to `Confirm` on the menu and press **`Enter`**. Type any other key and the change will not be made. This will cause the terminal to continue to prompt the user to confirm the change(s). To abort the change, move the highlight bar to `Exit`, and press the **`Enter`** key rather than confirming the change.

NOTE: Pressing the Escape key brings the display back to Select Local/Remote when in the Main Menu, and back to Exit when in the EXECUTION MENU.

Screen Description

The top four lines of each display screen contain information regarding the last two status or alarm conditions reported by the DL3800. This information includes: the severity of condition reported; the date and time it was reported; the Unit and NET (T1 port) reporting the alarm; a code for the type of condition, and a description of the condition.

The next two lines in the menu, which are always highlighted, represent the Status Bar. The first line of the Status Bar displays the product type, the software release number, node number, node name, date & time, and current alarm status of the unit. The second line displays the selected device address and name.

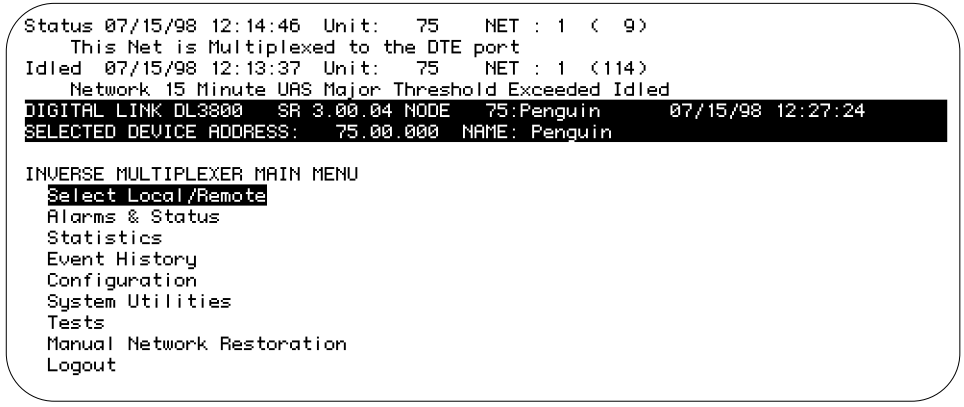


Figure 4-1 INVERSE MULTIPLEXER MAIN MENU

The product type is a DL3800 Digital Inverse Multiplexer.

The software revision is `3.XX`, where xx equals the latest software revision. This number is useful to determine the features that are supported with this release.

The Node number, in this case `75`, is user defined. This can be used to further identify the node within the user's network. It is recommended that all nodes be given a unique node number. This is crucial in inter-node communications.

The Node name (`Penguin`), is user defined. The user can use this field to uniquely describe the node within the network.

The date and time are give in mm/dd/yy, and hh:mm:ss format.

The alarm indicator, in this case `MN` for minor, is given on each screen to alert the user of a Local Node Alarm.

The Selected Device address, in this example `75.00.000` is shown at the beginning of the second status line. A device is a generic term to indicate a NODE (unit). The device Name is user defined. This can be used to describe the node or board's location or function within the network. In the examples in this manual, the name used is `Penguin`.

INVERSE MULTIPLEXER MAIN MENU COMMANDS

When a DL3800 is first powered up, the Main Menu (Figure 4-1 on page 4-3) appears on the terminal screen. This describes those functions that can be performed, parameters viewed, changed and/or deleted from this menu. The INVERSE MULTIPLEXER MAIN MENU items are shown in Table 4-1.

Table 4-1 Main Menu

Menu	Description
Select Local/Remote	Allows the user to move between the Main Menu of the Local and Remote units.
Alarms and Status	Provides current alarm and status report of the common equipment, DTE, and T1 lines.
Statistics	Allows the user to access the statistics menus of the various T1 lines.
Event History	Allows user to view and clear alarms and event history of the DL3800.
Configuration	Allows the user access Sub-Menus to configure certain parameters of the DL3800, network, and DTE.
System Utilities	Allows the user to perform various system utility functions such as download software, configure SNMP, configure login, and delete or save configuration.
Tests	Allows the user to initiate diagnostic loopbacks.
Manual Network Restoration	Allows the user to manually restore a T1 circuit instead of it being restored automatically upon the clearing of a problem.
Logout	Allows the user to log out of the DL3800 without having to wait for automatic logout.

These items are described in more detail in the following sections.

SELECT LOCAL/REMOTE

When in the INVERSE MULTIPLEXER MAIN MENU, this option allows the user to view and access the other items on either the local or remote DL3800. The Device Address and Name in the header portion of the display screen will identify the unit that the terminal is presently communicating with.

To move to the Main Menu of the other DL3800, highlight SELECT LOCAL/REMOTE and press **Enter**. The Device Address and Name in the header should change to the new unit as shown in Figure 4-2.

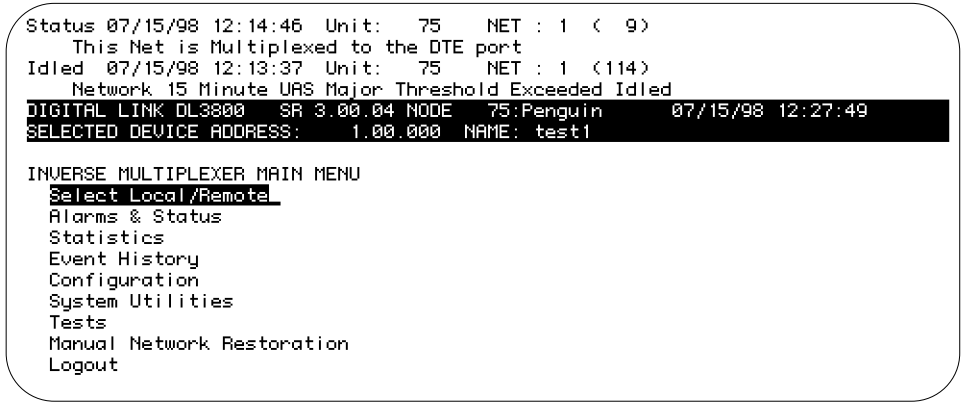


Figure 4-2 Main Menu with remote unit selected

ALARMS AND STATUS

The ALARMS AND STATUS MENU is a view only screen that allows the user to review the current ALARMS AND STATUS items being reported by the DL3800. To access this screen, move the highlight bar in the INVERSE MULTIPLEXER MAIN MENU to `Alarms And Status` and press **`Enter`**.

The ALARMS AND STATUS display (Figure 4-3) will appear on the screen describing the status of the common equipment and each of the T1 ports (lines), plus the status of the DTE leads and the current rate of the DTE port.

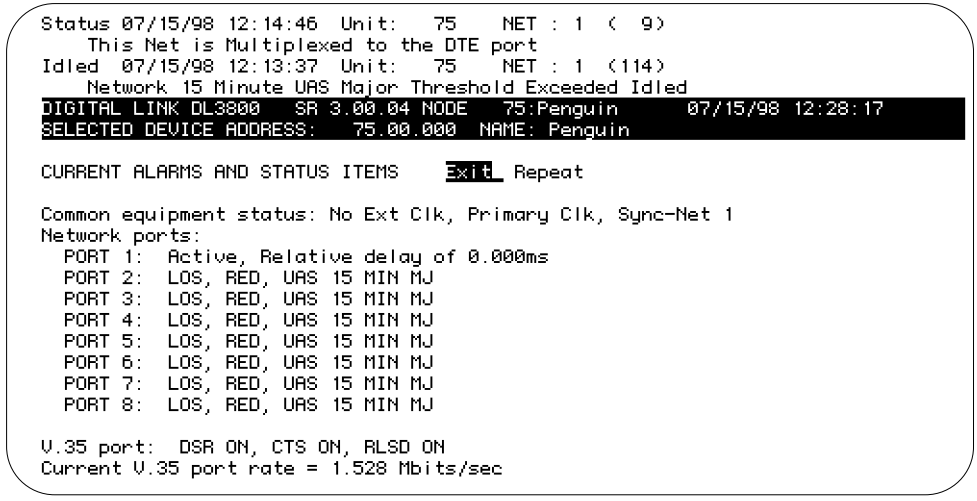


Figure 4-3 ALARMS AND STATUS MENU

Following are the Alarm and Status items (severity) that may appear. The Common Equipment alarms and status will appear first, followed by the Network and the DTE alarms and status.

Table 4-2 Alarms and Status

Network	Common Equipment	DTE
Not present	External Alarm	HSSI Channel Lpbk
LOS	Proc Restart	User Lpbk
LOF	RAM Test Fail	User Loopback
AIS det	ROM Checksum Fail	V.35 LT Lpbk
AIS	No Ext Clk	DTE Loss
YEL det	Primary Clock	DTR On
YEL	Secondary Clk	RTS On
Failed Signal	Internal Clk	RLB On
Xmt Failed	Sync-Net 1	LT On
User Line Lpbk	Sync-Net 2	TA On
User Payload Lpbk	Sync-Net 3	LA On
HW Line Lpbk	Sync-Net 4	LB On
HW Payload Lpbk	Sync-Net 5	DSR On

Table 4-2 Alarms and Status (Continued)

Network	Common Equipment	DTE
* Active	Sync-Net 6	CTS On
Not Active	Sync-Net 7	RLSD On
Excessive Delay	Sync-Net 8	TM On
Set Code Detected	No Net Sync	CA On
Reset Code Detected		LC On
CRC Threshold		
SES Threshold		
UAS Threshold		
BPV MN/MJ		
OOF MN/MJ		
BPV 15 Min MN/MJ		
CRCs 15 Min MN/MJ		
ES 15 Min MN/MJ		
SES 15 Min MN/MJ		
UAS 15 Min MN/MJ		
BPVs 24 Hr MN/MJ		
CRCs 24 Hr MN/MJ		
ES 24 Hr MN/MJ		
SES 24 Hr MN/MJ		
UAS 24 Hr MN/MJ		

NOTE: If the DL3800 is in Inverse Mux mode and receiving I-Framing on the T1 without Blue, Yellow, or Red Alarms or Major Alarm Thresholds being exceeded, the Alarm & Status display will read ACTIVE.

If the T1 Network Configuration is set to NEVER USE and a good T1 is connected, the Alarm & Status display will read NOT ACTIVE.

In Single DSU Mode, the DL3800 is Active if it is receiving valid T1 pulses from the network without Blue, Yellow or Red Alarms or Major Alarm Thresholds being exceeded and 1) if in HSSI mode the TA must be asserted or 2) if in non-HSSI mode the user must select DTR or RTS.

A Blue, Yellow or Red Alarm or the exceeding of Major Alarm Thresholds will cause the T1 to be taken out of service.

Statistics

This menu item allows the user to access the performance STATISTICS SUB-MENU of any T1 port. Highlight STATISTICS in the INVERSE MUX MAIN MENU, and press the **Enter** key. The STATISTICS MENU will appear on the screen.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:28:34
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

STATISTICS MENU          Exit

  NETWORK 1 STATISTICS
  NETWORK 2 STATISTICS
  NETWORK 3 STATISTICS
  NETWORK 4 STATISTICS
  NETWORK 5 STATISTICS
  NETWORK 6 STATISTICS
  NETWORK 7 STATISTICS
  NETWORK 8 STATISTICS
```

Figure 4-4 STATISTICS MENU

To view the performance statistics of any one T1 port, highlight that port and press **Enter**. The NET STATISTICS for that port (Figure 4-5) will appear on the screen.

The NET STATISTICS display presents the current and network performance statistics for the Current 15-minute interval, for the past 24 hours (CUMULATIVE 1) and the 24 hours preceding that interval (CUMULATIVE 2), in 15- minute increments. It also allows the user to clear the display and reset the counters. If the counters were reset within the past 24 hours, CUMULATIVE 2 will not display any errors.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:28:45
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

NET STATISTICS - PORT 1    Exit  Next  Repeat  Clear        Page  1

CURRENT SECONDS: 898     PAST INTERVALS:  0     ERROR-FREE SECONDS: 100.0%

                    CV      ES    ES-A    ES-B     SES     SAS    AISS     UAS
CURRENT              0       0       0       0       0       0       0       0

CUMULATIVE 1         0       0       0       0       0       0       0       0

CUMULATIVE 2         0       0       0       0       0       0       0       0
```

Figure 4-5 STATISTICS MENU (Screen #1)

To view additional pages with this set of performance data, press the Cursor Down Arrow, or to view the previous page, the Cursor Up Arrow.

Additional NET STATISTICS are presented in subsequent screens (Figure 4-6). To view additional screens with this same set of performance data, press the tab key or the Cursor right and left arrow keys until the next field is highlighted, then press **Enter**. Continue to press **Enter** with the NEXT field highlighted to view all the screens.

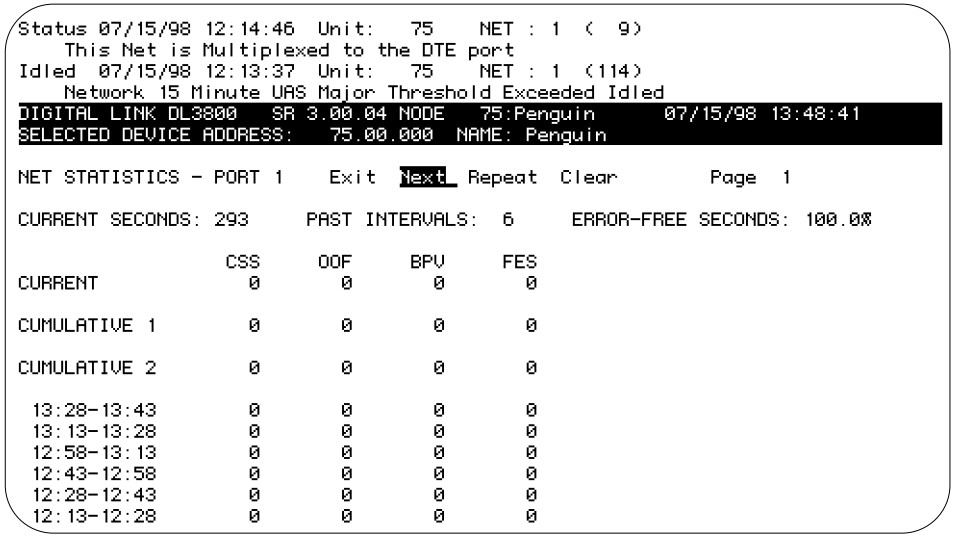


Figure 4-6 STATISTICS MENU (Screen #2)

Table 4-3 STATISTICS MENU Error Types

Parameter	Definition
CV	A Code Violation. CV is a count of Frame synchronization bit errors (FE) in the Super Frame (SF) format, or a count of the CRC-6 errors in the Extended Super Frame (ESF) format occurring during the accumulation period.
ES	An Errored Second. In the case of ESF, the count of one-second intervals containing one or more CRC-6 errors, or one or more CS events, or one or more SEF events. An SEF is a severely errored frame in which there are no LOS and no AIS events.
ES-A	In ESF format only, this is the count of one-second intervals with exactly one CRC-6, no SEF, and no LOS events.
ES-B	In ESF format only, this is a count of one-second intervals with no less than two and not more than 319 CRC-6 errors, no SEF events, and no LOS events.
SES	In ESF format, Severely Errored Seconds are defined as a count of one-second intervals with 320 or more CRC-6 errors, or an SEF defect. In SF, it is the count of one-second intervals with eight or more FE events, or an SEF defect.
SAS	SEF/AIS Seconds. In ESF only, this parameter is the count of one-second intervals containing one or more SEF defects or one or more AIS (Alarm Indication Signal) defects.
AISS	This parameter is a count of one-second intervals containing one or more AIS defects.

Table 4-3 STATISTICS MENU Error Types (Continued)

Parameter	Definition
UAS	This is a count of one-second intervals in which the DS1 path has been unavailable. The DS1 path is determined to be unavailable from the onset of 10 contiguous SESs, or the onset of the condition leading to a failure.
CSS	The Controlled Slip Second is a count of one-second intervals containing one or more controlled slips.
OOF	This is the number of seconds that the signal has been out of frame during the accumulation period. This counter is suppressed during an LOS condition. A total of 80 OOFs in a 10 second sliding window (approximately 10-3) will create a Major Alarm, and 5 OOFs in a 600 second sliding window (approximately 10-6) will create a Minor Alarm.
BPV	Bipolar Violations. This display provides the number of BPVs that have occurred during the accumulation period. A total of 15430 BPVs in a 10 second sliding window (approximately 10-3) will create a Major Alarm and 916 BPVs in a 600 second sliding window (approximately 10-6) will create a Minor Alarm.
FES	This display provides a count of the number of seconds containing Framing Bits that have been in error during the accumulation period.

Event History

This screen allows the user to review and clear the alarm and status history of the DL3800.

To view the EVENT HISTORY, move the highlight bar to EVENT HISTORY in the NODE MAIN MENU, and press the **Enter** key. Use the up and down cursor keys to move ahead to the next page or back to the previous page of the EVENT HISTORY MENU.

Table 4-4 Alarm Level

Alarm Parameter	Definition
Alarm Level:	
Major	Service affecting
Minor	Needs attention, not yet service affecting
Idled	Alarm condition has expired
Status	Non-service-affecting event
Date and Time	Date and time of the occurrence or expiration of the alarm/state
Address	The address is the physical location
Device	The device reporting the status and alarm condition (Unit #), and the type of device (NET, DTE, or NODE)

Table 4-4 Alarm Level (Continued)

Alarm Parameter	Definition
Event Code	Number designation for type of alarm or status condition. This number will be useful when contacting the factory
Description	Describes the event

To clear the report of all History Events, move the highlight bar to CLEAR HISTORY, and press the **Enter** key. Figure 4-7 is an example of the EVENT HISTORY MENU.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:29:46
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

EVENT HISTORY      Exit    Repeat    Clear History          Page  1

Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
Idled  07/15/98 12:13:22  Unit:   75    NET : 1  ( 30)
    Yellow Alarm Idled
Idled  07/15/98 12:13:21  Unit:   75    NET : 1  ( 28)
    Red Alarm Idled
Major  07/15/98 12:13:12  Unit:   75    NET : 1  ( 30)
    Yellow Alarm
Idled  07/15/98 12:13:12  Unit:   75    NET : 1  ( 14)
    Ais Signal Detected Idled
Idled  07/15/98 12:13:12  Unit:   75    NET : 1  ( 12)
    Loss Of Signal Idled
```

Figure 4-7 EVENT HISTORY MENU

Configuration

The CONFIGURATION MENU item provides access to a series of Sub-Menus to configure various parameters of the unit, DTE and network.

Highlight Configuration in the INVERSE MULTIPLEXER MAIN MENU and press the **Enter** key to access the CONFIGURATION MENU, shown in Figure 4-8.

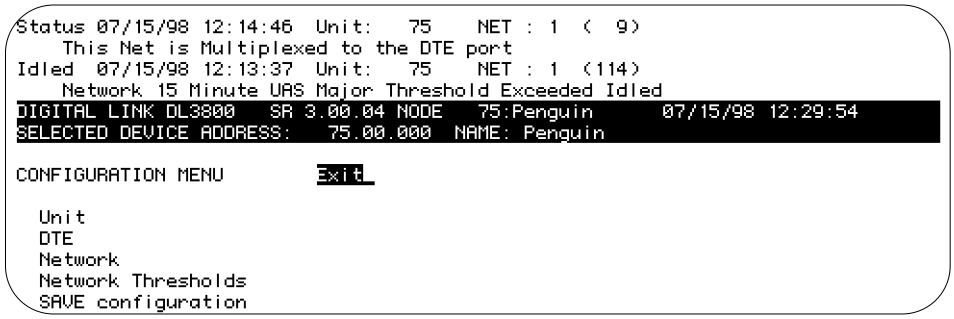


Figure 4-8 CONFIGURATION MENU

To access any of the CONFIGURATION SUB-MENUS, highlight the desired item and press the **Enter** key. The following are samples and descriptions of the Sub-Menus that can be accessed from the CONFIGURATION MENU.

Unit Configuration

Highlighting `Unit` and pressing the **Enter** key accesses the UNIT CONFIGURATION MENU shown in Figure 4-9. The configurable items and options are described in Table 4-5.

The following parameters can be set or changed for the Node: DATE, TIME, ALARM ENABLE, AUTOMATIC BACKUP, FRONT PANEL, UNIT NUMBER, UNIT NAME and LOCAL TERMINAL BAUD RATE, BITS/PARITY, STOP BITS, X-ON/X-OFF and MULTIDROP MODE. HARDWARE, SOFTWARE and MIB REVISIONS are view only items and cannot be changed.

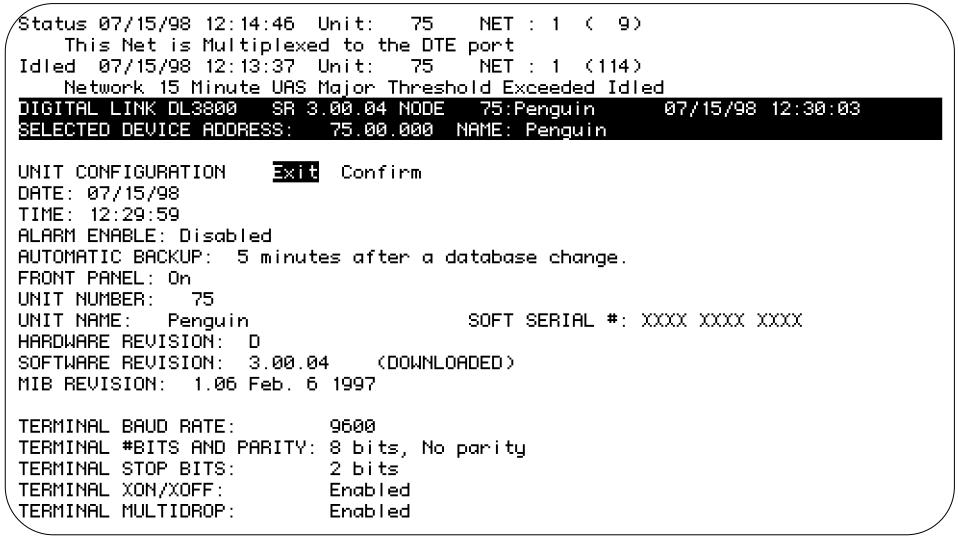


Figure 4-9 UNIT CONFIGURATION MENU

Table 4-5 Node Configuration Options

Option	Action
Date	Move the highlight bar to Date, and enter a valid date with the format MM/DD/YY, and press the **Enter** key. MM:12 month DD:31date YY: 99year
Time	Move the highlight bar to `Time`, and enter a valid time with the format hh:mm:ss, and press the **Enter** key.
Alarm Enable	Highlight `Alarm Enable`, and using the Spacebar, toggle between `Enabled` and `Disabled` until the desired choice appears.
Automatic Backup	This feature allows the user to back-up the database to the EEProm automatically at certain intervals or manually. To change the present backup mode, highlight `Automatic Backup`, and use the Space Bar to toggle between the following choices: after every database change, 15 seconds, 30 seconds, 1 minute, or five minutes after each change, or Off (must change manually with Save Configuration).
Front Panel	This feature enables (On) or disables (Off) the users ability to make changes in the configuration or run tests from the front panel display and buttons. To change the Front Panel feature, highlight `Front Panel`, and use the Space Bar to toggle between `Off` and `On`.

Table 4-5 Node Configuration Options (Continued)

Option	Action
Unit Number	Move the Highlight bar to `Unit Number`, and enter a number between 0 and 9999. Note: Each unit must be set to a different number to allow remote communication, and daisy chaining of multiple units. For example, if the remote unit is set to the same number as the local unit, you will not be able to access the remote unit.
Unit Name	Move the highlight bar to `Unit Name`, and press **`Enter`**.
Soft Serial Number	This feature allows the user to view the local serial number. If the remote unit is not software compatible with the soft serial number feature, the Unit Configuration screen still displays the serial number field but the information is incorrect. All the other information on the screen (for example, node number, hardware revision number) is still accurate. The soft serial number is preserved if the user enters a "Reset Entire Node Database to Factory Defaults" command.
Terminal Baud Rate	This feature selects the terminal baud rate. To set or change the baud rate, move the highlight bar to `Terminal Baud Rate`, and press the Space Bar to toggle between the options: 300, 600, 1200, 2400, 4800, 9600, 19,200, and 38,400. (Default - 9600)
Terminal Parity & Bits	This feature selects the terminal parity. To set or change the local terminal parity, move the highlight bar to `Terminal Parity & Bits`, and press the Space Bar to toggle between the options `None`, `Odd`, and `Even`. (Default - None)
Terminal Stop Bits	This feature selects the terminal stop bit requirement. To set or change the requirement, move the highlight bar to `Terminal Stop Bits`, and press the Space Bar to toggle between the options `1`, `1.5`, or `2`. (Default - 2)
Terminal XOn/XOff	This allows the user to enable or disable the XOn/XOff Flow Control feature. With the Flow Control feature On, the terminal can request that the DTE quit sending data when its buffers are full. To set or change this feature, move the highlight bar to `Terminal XOn/XOff`, and use the Space Bar to select choice. (Default - On)
Terminal Multidrop Mode	If the terminal is connected to more than one DL3800, it must be in Multidrop Mode. If it is connected to only one unit, this feature can be disabled. When it is disabled, the system starts up directly, without the user having to log in. To change this configuration, move the highlight bar to `Terminal Multidrop Mode`, and use the Space Bar to toggle between the options `Enabled`, and `Disabled`. (Default - Enabled)

DTE Configuration

This menu allows the user to configure certain parameters of the DTE, including the interface type, clock source, status of leads and loss criteria.

To access the DTE CONFIGURATION MENU, move the highlight bar to `DTE CONFIGURATION` in the CONFIGURATION MENU, and press **`Enter`**. Figure 4-10 is an example of the DTE CONFIGURATION MENU, and Table 4-6 describes the menu items.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:30:13
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

DTE CONFIGURATION     Exit  Confirm

  DTE INTERFACE:          V.35

V.35/RS-449/X.21 OPTIONS:
  CLOCK:                SCTE  Tx Clock: NORMAL    Rx Clock: NORMAL
  RLSD MODE:            AUTOMATIC
  DSR  MODE:            AUTOMATIC
  CTS  MODE:            AUTOMATIC
  TM   MODE:            AUTOMATIC
  DTE LOSS DETECTION: NONE
```

Figure 4-10 DTE CONFIGURATION MENU

Table 4-6 DTE CONFIGURATION MENU Options

Parameter	Description / Action
DTE Interface	This allows the user to select V.35, RS449, or HSSI as the DET Interface. To change the present DTE Interface, use the up and down arrow keys to highlight `DTE Interface`. Use the Space Bar to toggle between `V.35`, `RS-449`, and `HSSI` until the desired choice appears. Highlight `Confirm`, and press the **`Enter`** key to confirm the change. (Default - V.35)

Table 4-6 DTE CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
Clock	This item allows the user to enable either the SCT or SCTE leads, and to set the transmit (Tx), and receive (Rx) to Normal or Inverted mode. To set the DTE Clock parameters, use the up and down arrow keys to highlight the configurable `Clock` items, and use the Space Bar to toggle between the selections until the desired choice appears. The options are `SCT` or `SCTE`, `Tx Normal` or `Inverted`, and `Rx Normal` or `Inverted`. When the desired selection is in the display, highlight `Confirm`, and press the **`Enter`** key to confirm the change (Default - SCTE, Tx Normal, Rx Normal)
RLSD (Receive Line Signal Detector)	This allows the user to Assert, DeAssert, or set to Automatic the RSSD leads. To change or set the RLSD lead status, use the up and down arrow keys to highlight `RLSD`, and use the Space Bar to toggle between `Assert`, `DeAssert`, or `Automatic` until the desired choice appears. Highlight `Confirm`, and press the **`Enter`** key to confirm the change. (In Automatic mode, the 3800 places the signal high when you have a clear signal from the network, indicating the T1 is up and running.) (Default - Automatic)
DSR (Data Set Ready)	This allows the user to Assert, DeAssert, or set to automatic the DSR leads. To change or set the DSR lead status, use the up and down arrow keys to highlight `RLSD`, and use the Space Bar to toggle between `Assert`, `DeAssert`, or `Automatic` until the desired choice appears. Highlight `Confirm`, and press the **`Enter`** key to confirm the change. (In Automatic mode, the 3800 places the signal high when the DTE is sending the associated signal lead DTR.) (Default - Automatic)
CTS (Clear To Send)	This allows the user to Assert, DeAssert, or set to Automatic the CTS leads. To change or set the CTS lead status, use the up and down arrow keys to highlight `CTS`, and use the Space Bar to toggle between `Assert`, `DeAssert`, or `Automatic` until the desired choice appears. Highlight `Confirm`, and press the **`Enter`** key to confirm the change. (In Automatic mode, the 3800 places the signal high when the DTE is sending the associated signal lead RTS.) (Default-Automatic)

Table 4-6 DTE CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
TM (Test Mode)	This allows the user to Assert, DeAssert, or set to Automatic the TM leads. To change or set the TM lead status, use the up and down arrow keys to highlight `TM`, and use the Space Bar to toggle between `Assert`, `DeAssert`, or `Automatic` until the desired choice appears. Highlight `Confirm`, and press **`Enter`** to confirm the change. (In Automatic mode, the 3800 places the signal high when the DCE's signal leads for enabling tests are placed high by the DTE.) (Default - Automatic)
DTE Loss Detection	This allows the user to set the criteria by which a DTE Loss Of Signal will be detected. To change or set the DTE LOS criteria, use the up and down arrow keys to highlight `DTE LOSS DETECTION`, and use the Space Bar to toggle between the choices: `RTS`, `DTR`, and `None`. When the desired choice is shown, highlight `Confirm`, and press **`Enter`** to confirm the change. (Default - RTS)

Network Configuration

This menu item allows the user to set various parameters of each of the T1 lines, as well as select the primary and secondary clock sources, and various thresholds.

To access the NETWORK CONFIGURATION MENU, move the highlight bar to `NETWORK CONFIGURATION` in the CONFIGURATION MENU and press **`Enter`**.

The DL3800 is ordered from the factory for operation as either a DSX-1 or a CSU. The NETWORK CONFIGURATION MENU will be slightly different, depending on which version DL3800 is being used. Figure 4-11 shows the NETWORK CONFIGURATION MENU of the DSX version. Table 4-7 describes the various parameters included.

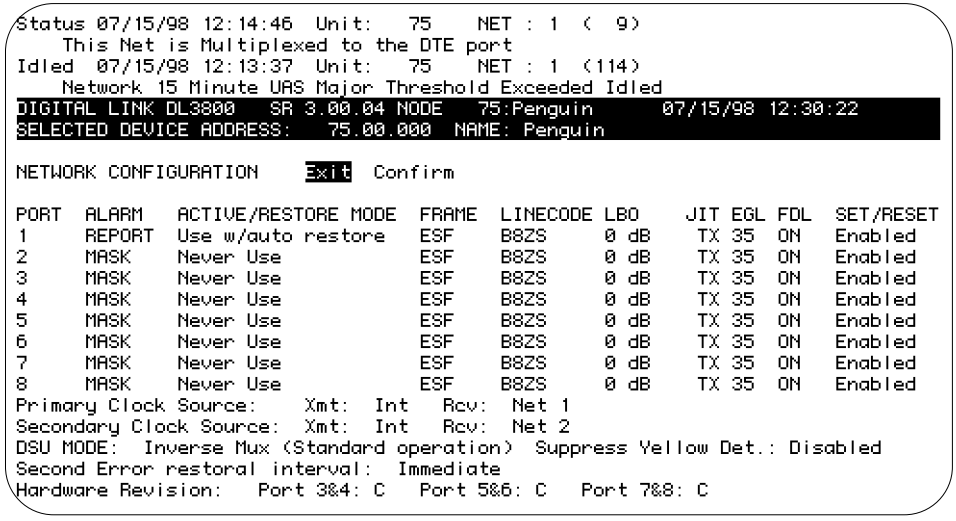


Figure 4-11 Network Configuration Screen (DSX-1 Mode)

Table 4-7 NETWORK CONFIGURATION MENU Options

Parameter	Description / Action
Alarm	This item allows the user to enable (Report) or disable (Mask) the DL3800 from reporting alarms or sending SNMP traps from any of the individual T1 network ports. To change the present Alarm mode, use the up and down arrow keys to highlight the `Alarm` item in the appropriate line for the desired port, and use the Space Bar to toggle between `Report` and `Mask`. Highlight `Confirm`, and press the **`Enter`** key to confirm any change. (Default - Mask)
Active / Restore Mode	This option selects the Active / Restore Mode for each of the T1 network ports. To change the present mode, use the up and down arrow keys to highlight the `Active/Restore Mode` option for the desired port, and use the Space Bar to toggle between the following selections until the desired choice appears: `use w/auto restore` (failed line is restored automatically when problem is solved); `use w/manual restore` (user must manually restore line); `Never Use` (never mux data onto this line); `Always Use` (always mux data onto this line, even when it's bad). (Default - Never Use)

Table 4-7 NETWORK CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
Framing Format	This allows the user to select either ESF or D4 (SF) as the Framing Format for the individual T1 network ports. To change the present Framing Format mode, use the up and down arrow keys to highlight the `Framing Format` item in the appropriate line for the desired port, and use the Space Bar to toggle between `ESF` and `D4` until the desired choice appears (Default - ESF)
Line Code	This allows the user to select either B8ZS or AMI as the Line Code for the individual T1 network ports. To change the present Line Code, use the up and down arrow keys to highlight the `Line Code` item in the appropriate line for the desired port, and use the Space Bar to toggle between `ESF` and `D4` until the desired choice appears. (Default -B8ZS)
Equalization (DSX-1 Only)	This allows the user to select Line Equalization distance for the individual T1 network ports. To change the present Equalization level, use the up and down arrow keys to highlight the `Equalization` Level, use the up and down arrow keys to highlight the `Equalization` item in the appropriate line for the desired port, and use the Space Bar to toggle between the following selections until the desired choice appears: `0'-132'`; `133'-265'`; `266'-398'`; `399'-532'` or `533'-655'`. (Default - `0'-132'`)
LBO (CSU Only)	This allows the user to select the LBO (Line Buildout) for the individual T1 network ports. To change the present LBO, use the up and down arrow keys to highlight the `LBO` item in the appropriate line for the desired port, and use the Space Bar to toggle between the following selections until the 0dB, -7.5dB, -15dB, and -22.5dB. (Default -)dB)

Table 4-7 NETWORK CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
JIT (CSU Only)	This allows the user to set Jitter Attenuation to either the Transmit (TX) or Receive (RX) side of the line. To change the present Jitter Attenuation side, use the up and down arrow keys to highlight the JIT item in the appropriate line for the desired port, and use the Space Bar to toggle between TX and RX until the desired choice appears. (Default -TX) If TX is selected, the CSU will reduce the jitter being transmitted to the network. Select TX if the unit is running on the internal clock. If RX is selected, the CSU will reduce the jitter being received from the network. Select RX if the unit is running on the network clock.
EGL (CSU Only)	This allows the user to set the Equalizer Gain Limit at either up to 36dB or less than 26dB. To change the present EGL, use the up and down arrow keys to highlight the EGL item in the appropriate line for the desired port, and use the Space Bar to toggle between 36 dB and <26 dB until the desired choice appears. (Default -36 dB)
FDL	This allows the user to turn the FDL On or Off, and to select AT&T 54016 or ANSI T1.403 reporting standards. When On, the DL3800 supports both standards. When set to ATT or ANSI, the user is selecting ONLY that standard. To change the FDL, highlight the FDL line for the desired port, and using the Space Bar, toggle between On, Off, ATT, and ANSI until the desired choice appears. (Default-On)
Set/Reset	This allows the user to set the DL3800 to recognize (Enable) or ignore (Disable) the standard CSU loop back set, and reset codes. Highlight the Set/Reset line for the desired port, and, using the Space Bar, toggle between On and Off until the desired choice appears. (Default-Enabled)

Table 4-7 NETWORK CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
Primary Clock Source	This allows the user to select either the Primary Clock Source, transmit (xmt), and receive (rcv) for the individual T1 network ports. To change the present Primary Clock Source, use the up and down arrow keys to highlight either Xmt or Rcv on the Primary Clock Source line, and use the Space Bar to toggle between the choices. For Xmt (transmit) the choices are Network (NET), External (EXT), and Internal (INT). For Rcv (receive) the choices are Net-1 through Net 8 (each of the individual T1 network ports), or Auto (the unit selects the best source). The DL3800 can use several sources to generate the transmit clock. The Internal selection uses an oscillator within the DL3800, the Network setting recovers the clock from the selected T1 line, and the External setting recovers the clock from the dB-9 Ext. Clock connector on the rear panel of the unit. Typically, the clock source on one side of the link is set to Internal, and the other is set to Network. (Default - Smt: Int., Rcv: Net 1)
Secondary Clock Source	This allows the user to select either the Secondary Clock Source, transmit (xmt), and receive (rcv) for the individual T1 network ports. To change the present Secondary Clock Source, use the up and down arrow keys to highlight either Xmt or Rcv on the Secondary Clock Source line, and use the Space Bar to toggle between the choices. For Xmt (transmit), the choices are Network (NET), External (EXT), and Internal (INT). For Rcv, the choices are Net-1 through Net 8 (each of the individual T1 network ports) or Auto (the unit selects the best source) until the desired choice appears. (Default - Xmt: Int, Rcv: Net2)
DSU Mode	This allows the user to set the DL3800 up as a DSU, with one DTE, and one Network port. To change the present DSU Mode level, use the up and down arrow keys to highlight the DSU Mode item, and use the Space Bar to toggle between the following selections until the desired choice appears: Inverse MUX (standard operation) or Single T1 DSU. Highlight Confirm, and press the **Enter** key to confirm the change. (Default-Inverse Mux)
Suppress Yellow Detect	This item allows the user to configure the unit to ignore or report yellow alarm conditions when in D4 framing. To change the present Suppress Yellow Detect, use the up and down arrow keys to highlight the item, and use the Space Bar to toggle between Enabled and Disabled until the desired choice appears. Highlight Confirm, and press the **Enter** key to confirm the change. (Default - Disabled)

Table 4-7 NETWORK CONFIGURATION MENU Options (Continued)

Parameter	Description / Action
Second Error Restoral Interval	This item selects the time that a failed T1 line must run without errors in order to be restored automatically. If a network alarm is exceeded for a second time within the selected window (15 minutes or 24 hours), the line will not be restored. To change the present Restoral Interval, use the up and down arrow keys to highlight the item, and use the Space Bar to toggle between the following selections until the desired choice appears: `Immediate`, 5,10,15, or 30 seconds, and 1, 5, 10, and 15 minutes. (Default: 15 minutes)

Network Thresholds

This menu allows the user to enable/disable the automatic FALLBACK feature, and set the various Network Alarm Thresholds that will cause the T1 lines to automatically be taken out of service.

Figure 4-12 is an example of the NETWORK ALARM THRESHOLDS configuration screen.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:30:32
SELECTED DEVICE ADDRESS:    75.00.000  NAME: Penguin

NETWORK ALARM THRESHOLDS     Exit  Confirm

CONSECUTIVE THRESHOLDS     FALLBACK    SECONDS
  CRC Seconds              Disabled      10
  SES                      Disabled      10
  UAS                      Disabled      10

INTERVAL THRESHOLDS              15 MINUTES                    24 HOURS
                          FALLBACK   MAJOR   MINOR     FALLBACK   MAJOR   MINOR
  BPV Err Sec(10E-3)      Disabled     100     100     Disabled      10      10
  CRC Seconds             Disabled     100     100     Disabled      10      10
  ES                      Disabled     100     100     Disabled      10      10
  SES                     Disabled     100     100     Disabled      10      10
  UAS                     Disabled     100     100     Disabled      10      10
```

Figure 4-12 Network Thresholds Configuration

Through the CONSECUTIVE THRESHOLDS section of this menu, the user disables or enables the fallback condition relating to the number of consecutive seconds (from 1 to 100) in which a CRC, SES or UAS alarm threshold is exceeded. To Enable or Disable the FALLBACK feature, highlight the appropriate item, and use the space bar to select your choice.

To change the number of errored consecutive seconds that will cause that T1 line to go out of service, highlight the appropriate item and press **Enter**. When the highlight bar is blank, type in the number of seconds desired.

NOTE: Default settings are shown in Figure 4-12

The INTERVAL THRESHOLDS section of this menu allows the user to enable or disable the FALLBACK feature. FALLBACK relates to the number of in-error seconds (from 1 to 900) occurring in a 15-minute period, or the number of in-error 15-minute intervals (from 1 to 96) occurring in a 24-hour period that will cause a MAJOR or MINOR alarm. To Enable or Disable the FALLBACK feature, highlight the appropriate item and use the space bar to select your choice. To change the number of in error seconds or 15-minute intervals that will cause a MAJOR or MINOR network alarm, highlight the appropriate item and press **Enter**. When the highlight bar is blank, type in the number desired.

Save Configuration

This option allows the user to manually back up the database to EEPROM at any time. To Save Configuration and back up the database to EEPROM, highlight the `Save Configuration` in the CONFIGURATION MENU, and press the **Enter** key.

System Utilities

The SYSTEM UTILITIES MENU in the INVERSE MULTIPLEXER MAIN MENU is used to access Sub-Menus in the DL3800 to configure various system utilities and perform certain functions with the DL3800. These System Utilities include Software Download, Delete Entire Node Configuration, Login Configuration, SNMP Configuration, and Save Configuration.

To access the SYSTEM UTILITIES MENU, highlight `System Utilities` in the INVERSE MULTIPLEXER MAIN MENU, and press the **Enter** key.

Figure 4-13 is an example of the SYSTEM UTILITIES MENU that will appear. To access any of the Sub-Menus or perform certain functions, highlight that line item, and press the **Enter** key.

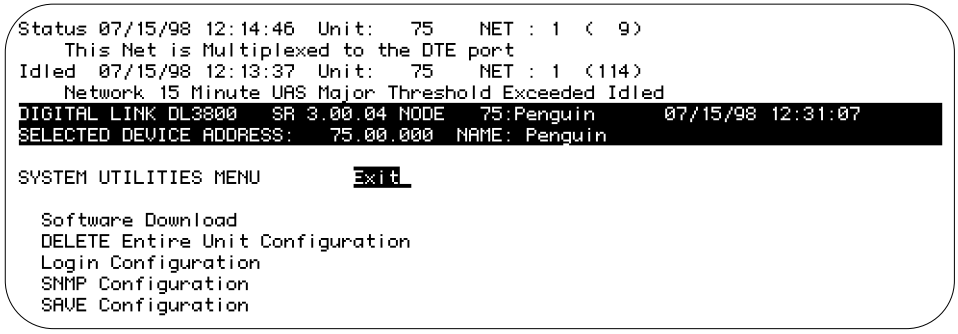


Figure 4-13 SYSYTEM UTILITIES MENU Figure

Software Download

This selection allows the user to choose the desired mode for upgrading the software revision level of the DL3800 via download if this option is available. Highlight SOFTWARE DOWNLOAD in the SYSTEM UTILITIES MENU, and press **Enter**. The SOFTWARE DOWNLOAD MENU (Figure 4-14) will appear on the screen.

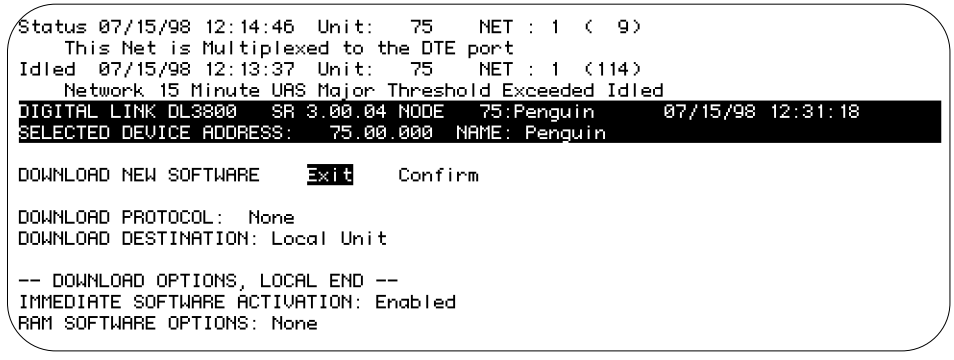


Figure 4-14 SOFTWARE DOWNLOAD MENU

To download new software to the DL3800, the following equipment is needed.

- A PC with a disk drive capable of reading an MS DOS binary file is required. Digital Link provides a 3.5 inch floppy formatted for 1.4 Mb for downloading software.
- A terminal emulation program such as Procomm, Mirror, or Xtalk with VT100 or ANSI emulation that supports one or all of the following:
    - Motorola S-Records with ASCII Transfer

- Binary Image with Xmodem
- Binary Image with Kermit

Make the proper RS-232 connection between the PC and the DL3800. A DE-9 connector is pinned out on the DL3800 such that the use of a null modem is not necessary. DE-9 to DB-25 adapters may be needed depending upon the PC used.

NOTE: The following steps are recommended before initiating the download process.

- Disable all control lead dependencies (RTS, CTS, DCD, etc.)
- Enable XON/XOFF flow control.
- Disable DCD (Data Carrier Detect) aborts (especially on Procomm).

1. **Copy the files off the floppy onto the hard drive on the PC. The names of the files will vary in accordance with the current software revision. The file name should look similar to the following: Vxxxxx.RAM.**
2. **Start the emulation program on the PC and set it up match the DL3800 comm port configuration. Default configuration for the DL3800 is 9600 Baud, 8 bits, No parity, 2 stop bits. Connect the PC serial port to the DL3800 COMM PORT .**
3. **If the DL3800 is set up for "Direct Terminal" configuration, typing a `Ctrl-L` will refresh the screen. If it is set up for multidrop mode, see "Log In/Log Off" on page 4-1 on how to Log in to a unit.**
4. **Select the `Software Download` option from the SYSTEM UTILITIES MENU. On the SYSTEM UTILITIES MENU scroll down to where it says `None` and press the space bar until the desired mode appears. Select `CONFIRM` and press `Enter` again to save the change. The DL3800 is now ready to receive a file.**
5. **Enter the file transfer mode on the terminal emulation program and transfer the appropriate file. The file transfer will take at least 30 minutes at 9600 baud.**
6. **Once the file has downloaded, the DL3800 will take up to 30 seconds to reboot if the IMMEDIATE SOFTWARE ACTIVATION feature is enabled. If any communications errors were encountered, it may be necessary to perform this operation again.**

Software Download Options

Immediate Software Activation (Enable/Disable)

The IMMEDIATE SOFTWARE ACTIVATION mode is controlled from the SYSTEMS UTILITIES/SOFTEWARE DOWNLOAD MENU. When the IMMEDIATE SOFTWARE ACTIVATION feature is enabled, the software download (using MSR, Xmodem, Kermit, TFTP) is immediately activated (that is, copied from RAM to FLASH and rebooted).

For consistency with the previous software version, IMMEDIATE=enabled is the default setting. If the IMMEDIATE SOFTWARE ACTIVATION feature is disabled, the software download (using MSR, Xmodem, Kermit, TFTP) is not activated (that is, not copied from RAM to FLASH and not rebooted).

The user must activate the software at a later time by issuing a software download activation command from the System Utilities/Download Software/ RAM SOFTWARE OPTIONS selection field. When the software activation command is executed, the system copies the software image from RAM to Flash and reboots.

A system restart (power cycle) that occurs after the download, but before the activation, will not activate the new software. Loss of power causes the non-activated software download to be lost.

Download Destination (Local Unit, Remove Unit, Both Units)

This feature provides software to be loaded to either the local unit, the remote unit, or both. The user must make sure the file being loaded contains the software image compatible with the particular equipment type for either end (that is, DL3800 versus DL3900). Use of the Remote or Both option requires use of the Xmodem or Kermit protocol.

A file image loaded to the remote unit is sent over the proprietary IMUX Embedded Data Link (EDL). The EDL is available regardless of the T1 line coding and framing.

To download to the Remote Unit, the user does not log into the Remote; instead the user selects the download destination using the Download Destination field which allows a download to both units at once. It also minimizes disruption to the terminal interface session when the Remote Unit does an immediate software activation (which involves that unit's rebooting).

RAM Software Options

RAM Software Options - Query RAM Software

This feature determines when a valid software image exists in RAM by checking the CRC and image ID. The query indicates if the software can be activated in the unit. This is important if a remote software download is being done from a DL3900 to a DL3800 or the other way around.

The following response messages are possible:

`RAM Image is valid.` - CRC is valid, Image ID is valid

`RAM Image is active – no reboot necessary.` - CRC is valid, Image ID is valid, but images are identical.

`RAM Image is invalid (Product ID Error) xxxxxx` - CRC is valid, Image ID is xxxxxx.

`RAM Image is invalid (Size too small)` - Header indicated the code buffer is too small.

`RAM Image is invalid (Size too big)` - Header indicated the code buffer is beyond its range.

`RAM Image is invalid (CRC error)` - CRC is invalid.

An image ID is a string consisting of DL3800, DL3900, DL3800E, or DL3800/DL3900. The image ID DL3800/DL3900 is reserved for use in a future application.

This command does not activate the software if it is downloaded and is pending activation, nor does it indicate the software revision of the downloaded image.

Querying the Remote Unit is performed by first logging into the remote unit from the Main Menu, then navigating to this menu.

RAM Software Options - Activate RAM Software

This feature activates downloaded software by copying the code from RAM to FLASH and then rebooting the unit. If a valid (that is, Image ID and CRC are valid) software image does not exist in RAM, the command fails and a reboot will not occur.

An extended loss of power causes the non-activated software download to be lost.

Modifying this setting in the Remote Unit is performed by first logging into the remote unit from the Main Menu, then navigating to this menu.

TFTP Software Download

If immediate software activation is enabled on the target unit, the software is downloaded to the target unit, and is activated by copying the code from RAM to FLASH and then rebooting.

A TFTP Software Download server is built into the DL3800. This feature allows the user to do an TFTP transfer (using the SLIP/NMS port) to the unit RAM. The user issues the "Put" command to the unit to initiate the transfer. If the user specifies the remote unit IP address, the local unit forwards the TFTP packets to the remote unit.

Once the transfer is complete, activation is based on the setting of the Immediate Software Activation feature with the following results:

- If Immediate Software Activation is disabled on the target unit, the software is downloaded to the RAM of the target unit, but is not activated and a reboot does not occur.
- If Immediate Software Activation is enabled on the target unit, the software is downloaded to the RAM of the target unit, and is activated by copying the code from RAM to FLASH memory and then rebooting.

The performance of the TFTP data transfer is limited by the speed of the NMS/SLIP port, which has a maximum 38400 baud rate and the Embedded Data Link if the transfer is going to the remote unit. Only the "Put" TFTP server is functional; the user is not able to do a "Get" of the software from the unit.

Ensure that you specify binary mode instead of ascii mode in the TFTP client.

Delete Entire Unit Configuration (revert to factory config)

WARNING: This command may interrupt service.

Deleting the unit database causes the unit, and any other device's database within that unit, to be reset to the factory default setting. All device names will be erased, and all connections will be removed. The time and date, however, will remain the same, and the node number will be set to "0.00.00".

As the warning states above, if there are any valid connections in the node, execution of this command may interrupt service.

To delete the entire unit configuration, select DELETE ENTIRE UNIT CONFIGURATION from the SOFTWARE UTILITIES MENU, and press **Enter**. Use the arrow keys to highlight the Desired Action field. Press the space bar until RESET ENTIRE NODE DATABASE TO FACTORY DEFAULTS appears in the field. The change must then be confirmed. Move the highlight bar to CONFIRM, and press the **Enter** key. Deleting the entire node configuration puts all parameters back to their Factory Default Settings.

From the DELETE ENTIRE UNIT CONFIGURATION screen you may also perform the following functions:

- Delete RAM code and Revert to ROM code
- Restart Node Software

Delete RAM Code and Revert to ROM Code

To delete RAM code and revert to ROM code, select DELETE ENTIRE UNIT CONFIGURATION from the SOFTWARE UTILITIES MENU, and press **Enter**. Use the arrow keys to highlight the Desired Action field. Press the space bar until DELETE RAM CODE AND REVERT TO ROM CODE appears in the field. The change must then be confirmed. Move the highlight bar to CONFIRM, and press **Enter**.

NOTE: Revert to ROM code only when the downloaded software does not perform better than the ROM software. Reverting to ROM software will reset the unit.

Restart Node Software

Restart Node Software allows you to reset the unit without powering down.

To Restart Node Software, select DELETE ENTIRE UNIT CONFIGURATION from the SOFTWARE UTILTIES MENU, and press **Enter**. Use the arrow keys to highlight the Desired Action field. Press the space bar until RESTART NODE SOFTWARE appears in the field. The change must then be confirmed. Move the highlight bar to CONFIRM, and press **Enter**.

Login Configuration

This screen allows the user to designate a NAME, PASSWORD and ACCESS PRIVILEGE LEVEL for up to eight users.

When the unit is shipped, the factory defaults for username and password are null. Pressing the **Enter** key bypasses both of these parameters until the first name and password are entered.

To access the LOGIN CONFIGURATION MENU, move the highlight bar to LOGIN CONFIGURATION in the NODE MAIN MENU and press the **Enter** key. Figure 4-15 is an example of the LOGIN CONFIGURATION MENU.

```
Status 07/15/98 12:14:46  Unit:    75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:    75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:31:44
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

LOGIN CONFIGURATION     Exit  Confirm

  USER IDENTIFICATION   PASSWORD          ACCESS TYPE(S)
1)                                        Full access
2)                                        No access
3)                                        No access
4)                                        No access
5)                                        No access
6)                                        No access
7)                                        No access
8)                                        No access


TERMINAL AUTOMATIC LOGOUT:  Off.  (Must use Logout to return to login prompt).
  TELNET AUTOMATIC LOGOUT:  5 minutes after no keyboard activity.
```

Figure 4-15 LOGIN CONFIGURATION MENU

NOTE: Name and Password are case-sensitive

Only those users who are granted "Full Access" class can view or change this screen.

The name and password can be any alphanumeric designation up to 16 characters in length. To enter a name or password, move the highlight bar to the appropriate line and column, and type in the alphanumeric designation. Move the highlight bar to CONFIRM, and press **Enter** to confirm the changes.

To designate the access privileges that a particular user is to be allowed, move the highlight bar to that column of the menu on the user line and, using the space bar, toggle between the following options; FULL ACCESS, MAINTENANCE, PROVISION, PROVISION+MAINTENANCE, NO ACCESS, and DISPLAY ONLY.

NOTE: At least one user must have full access to the unit.

Table 4-8 Login Configuration Options

Parameter	Description
Full Access Class	Allows the user to view any menu and perform any function. It is the only access class where the user is allowed to view the LOGIN CONFIGURATION MENU and assign names, passwords, and access levels to users. This user is also the only one who can change the SNMP Configuration, Download Software, or Delete Entire Node Configuration
Maintenance	Allows the user to clear the event history log, clear statistics, and initiate tests.
Provision	Allows the user to configure the DL3800.
Provision + Maintenance	Allows the user to perform all functions allowed Provision and Maintenance access described above.
Display Only	Allows the user access to view only screens. The user is not allowed to make any changes or initiate tests.
No Access	Not allowed to access the menu screens.
Terminal Automatic Logout	Allows the user to set the Automatic Logout feature of the DL3800. The unit will logout if no activity is detected for the amount of time configured. To change configuration, highlight the item and, using the Space Bar, toggle until your selection appears. Move the highlight to `Confirm`, and press **`Enter`** to confirm the change. The default is Off, with three min., five min., 10 min. and 30 min. also configurable.
Telnet Automatic Logout	Same as Terminal Automatic logout, but for telnet connections. The default is five min., with Off, three min., 10 min. and 30 min. also configurable.

NOTE: If the user tries to access a screen or perform a function beyond their access level allowed, the following message will appear on the screen: “Access denied - your account does not have this PRIVILEGE”.

SNMP Configuration

Through the SNMP CONFIGURATION MENU, the user configures the Network Manager (NMS) port on the rear panel of the DL3800, setting various addresses and configurable items required for operation with an SNMP Network Manager. The DL3800 utilizes SLIP protocol over the RS232 port to communicate with the SNMP management station.

To access the SNMP CONFIGURATION MENU, move the highlight bar to `SNMP CONFIGURATION` in the CONFIGURATION MENU, and press **`Enter`**.

Figure 4-16 is an example of the SNMP CONFIGURATION MENU, and Table 4-9 describes the SNMP parameters:

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 12:31:53
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

SNMP CONFIGURATION    Exit  Confirm
NMS SERIAL PORT (SLIP)
    UNIT IP ADDRESS:       0.000.000.000   UNIT IP SUBNET MASK:   0.000.000.000
    TRAP IP ADDRESSES:     0.000.000.000   Port: Slip
                           0.000.000.000   Port: Slip
                           0.000.000.000   Port: Slip
  REMOTE IP ADDRESS:       0.000.000.000
  SLIP TRAP DELAY:   0 seconds   REMOTE TRAP DELAY:   0 seconds

READ COMMUNITY STRING:     public
WRITE COMMUNITY STRING:    public
TRAP COMMUNITY STRING:     public

SNMP BAUD RATE:        9600
SNMP #BITS AND PARITY: 8 bits, No parity
SNMP STOP BITS:        2 bits
```

Figure 4-16 SNMP CONFIGURATION MENU

Table 4-9 SNMP Configuration Options

Option	Description / Action
Unit IP Address	The Unit IP Address is a 32-bit quantity which uniquely identifies the node in the IP network. This address is used by the SNMP manager to access information from the node. To set or change the Unit IP Address, move the highlight bar to `Unit IP Address`, and enter a 32-bit quantity. Press **`Enter`** when finished.

Table 4-9 SNMP Configuration Options (Continued)

Option	Description / Action
Unit IP Subnet Mask	The Unit IP Subnet Mask is a 32-bit quantity that identifies which bits in the IP address identify the physical network. The user can specify up to three different IP addresses. To set or change the Unit Subnet Mask, move the highlight bar to `Unit Subnet Mask`, and enter a 32-bit quantity. Press **Enter** when finished.
Trap IP Address	The Trap IP Address is a 32-bit quantity that identifies the SNMP manager, the address to which the node sends any event messages. To set or change the Trap IP Address, move the highlight bar to `Trap IP Address`, and enter a 32-bit quantity. Press **Enter** when finished.
Port	This allows the user to set the port the DL3800 will use to send traps. The setting `SLIP` will cause traps to be sent out the **NMS** SLIP port on the local unit. The setting `Remote` will cause the unit to send traps over the embedded data link across the T1s.
Read Community String	This alphanumeric identifier, up to 32 characters in length, identifies a portion of the SNMP network that is able to read messages from the node. To set or change the Read Community String, move the highlight bar to `Read Community String` and enter an alphanumberic identifier, up to 32 characters in length. Press **Enter** when finished.
Write Community String	This alphanumerical identifier, up to 32 characters in length, identifies a portion of the SNMP network that can write messages to the node. To set or change the Write Community String, move the highlight bar to `Write Community String`, and enter an alphanumeric identifier, up to 32 characters in length. Press **Enter** when finished.
Trap Community String	This alphanumeric identifier, up to 32 characters in length, identifies a portion of the SNMP network that is able to receive event messages from the node. To set or change the Trap Community String, move the highlight bar to `Trap Community String`, and enter an alphanumerical identifier. Press **Enter** when finished.

Table 4-9 SNMP Configuration Options (Continued)

Option	Description / Action
SNMP Baud Rate	This feature selects the SNMP port's baud rate. To set or change the SNMP port baud rate, move the highlight bar to `SNMP Baud Rate`, and press the Space Bar to toggle between the options until the desired speed appears. The options are: `300`; `600`; `1200`; `2400`; `4800`; `9600`; `19,200` and `38,400`. (Default - 9600) If the SNMP Baud rate is changed, it is necessary to change the baud rate at the connection to the SNMP manager before continuing. The same is true for modifying the parity and / or number of stop bits.
SNMP Bits & Parity	This feature selects the SNMP port's parity. To set or change the SNMP Parity, move the highlight bar to `SNMP Bits & Parity`, and press the Space Bar to toggle between the options until the desired parity appears. The options are: `None`, `Odd`, and `Even`. Bits is always set at 8. (Default - None)
SNMP Stop Bits	This feature selects the SNMP manager stop bit requirement. Move the highlight bar to `SNMP Stop Bits`, and press the Space Bar to toggle between the options `1`,`1.5`, or `2`. (Default-2)

To update the SNMP database with all the changes made, move the highlight bar to `CONFIRM`, and press the **`Enter`** key. Changes can be confirmed after each change or after all changes have been made.

IP Bridging to a Remote Unit

The IMUX unit now supports bridging of selected IP packets to the remote IMUX unit. The bridged packets are transported between the remote unit and the local NMS/SLIP port using the proprietary Embedded Data Link. In order to minimize bandwidth constraints, only the following protocols are bridged:

- SNMP
- Ping (ICMP Echo Request/Echo Response, a subset of full ICMP)
- TFTP
- SNMP Traps from remote

The illustration below shows the SNMP Configuration from the SYSTEM UTILITIES MENU.

The IMUX unit has a configurable "Remote IP Address" parameter used to identify the remote unit. The remote IMUX's "Unit IP Address" parameter should be set to the same value, although this is not strictly necessary.

However, it is important to note that the remote IMUX's "Unit IP Address" parameter must be set to some non-zero value in order to respond to the bridged IP packets.

SNMP trap packets from the remote IMUX unit are modified upon receipt. The source IP address field in the trap packet is modified to the "Remote IP Address" parameter; then the packet is forwarded out the NMS/SLIP link.

In-Band SNMP to Remote

This feature allows the user to manage both local and remote units with a single NMS station attached to only one of the two units.

If the unit receives an SNMP packet from its SLIP port with the IP address of the remote unit, the local unit forwards the packet to the remote unit over the Embedded Data Link.

If the unit receives an SNMP packet that does not match its IP address or the IP address of the remote unit, the packet is discarded.

The unit responds to SNMP packets with its IP address from an NMS with any IP address (no change from the current functionality).

The unit transmits SNMP responses from either its SLIP port or to the remote unit depending on the direction from which the packet came.

The IP address of the remote unit must be set to a non-zero value for this feature to work. This field is shown in Figure 4-16 on page 4-33.

Save Configuration

This option allows the user to manually backup the database to EEPROM at any time. To SAVE CONFIGURATION and backup the database to EEPROM, highlight SAVE CONFIGURATION in the SYSTEM UTILITIES MENU, and press the **Enter** key.

Tests

The TESTS MENU allows the user to initiate or stop four types of loopbacks for each individual network port: DTE/NETWORK LOOPBACK for the DTE, PAYLOAD LOOPBACK, LINE LOOPBACK, and LOCAL LOOPBACK. For troubleshooting suggestions see "Troubleshooting the DL3800" on page 6-3.

To access the TESTS MENU, move the highlight bar to TESTS in the DL3800 Main Menu, and press **Enter**.

Figure 4-17 is an example of the TESTS MENU. The individual loopbacks and operation of the menu are described below in the text following the menu.

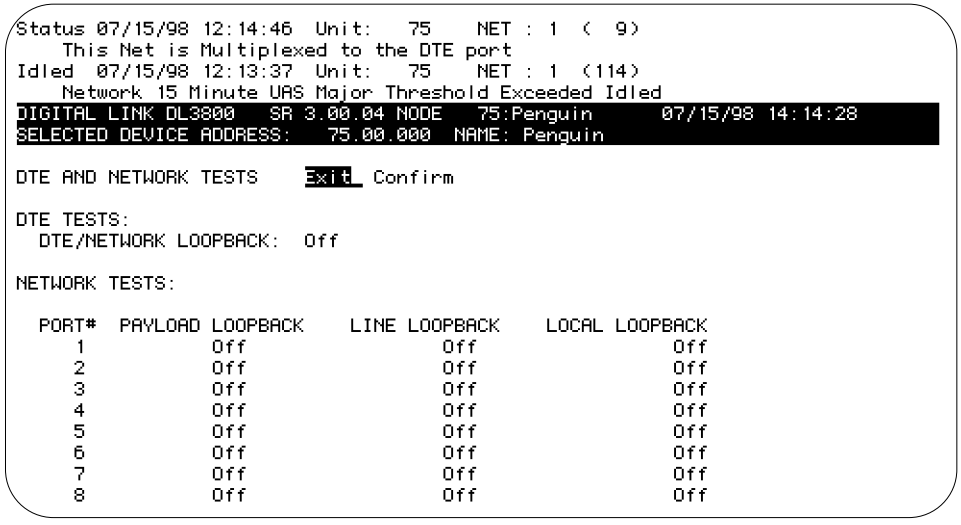


Figure 4-17 TESTS MENU

To initiate a test, use the CURSOR keys to move the highlight bar to DTE/NETWORK LOOPBACK or a PAYLOAD or LINE LOOPBACK on a selected port. Use the space bar to toggle between OFF and ON until ON appears in the display. When that selection appears in the display, move the highlight bar to CONFIRM, and press the **Enter** key. To cancel a test that is running, move the highlight bar to DTE/NETWORK LOOPBACK. Use the space bar to toggle between the options until OFF appears in the display. Move the highlight bar to CONFIRM, and press the **Enter** key.

DTE/Network Loopback

The DTE/NETWORK LOOPBACK is a bi-directional loopback that loops the received DTE signal back to the DTE and the signal from the T1 processor back towards the T1 network. This loopback is used to verify the operation of the DTE and associated cabling.

Payload Loopback

The payload loopback is used to verify proper T1 network operation of the DL3800 and the T1 network. The Payload Loopback loops the payload data received from the T1 network back towards the network. The data is regenerated, and a new framing pattern is inserted prior to being looped back. In this way the T1 framing of the unit and network can be verified.

Line Loopback

The line loopback is used to verify the operation of the T1 network. The line loopback loops the data received from the T1 network back towards the network. The data is regenerated prior to being looped back; however, no additional processing of the data is done by the DL3800. This minimizes the impact of the DL3800 during this test so that network problems can be isolated.

Local Loopback

The local loopback is used to verify the operation of the DTE and connections. The local loopback loops the data received from the DTE back towards the DTE at the network interface.

WARNING: The Loopback tests will interrupt traffic to the DL3800.

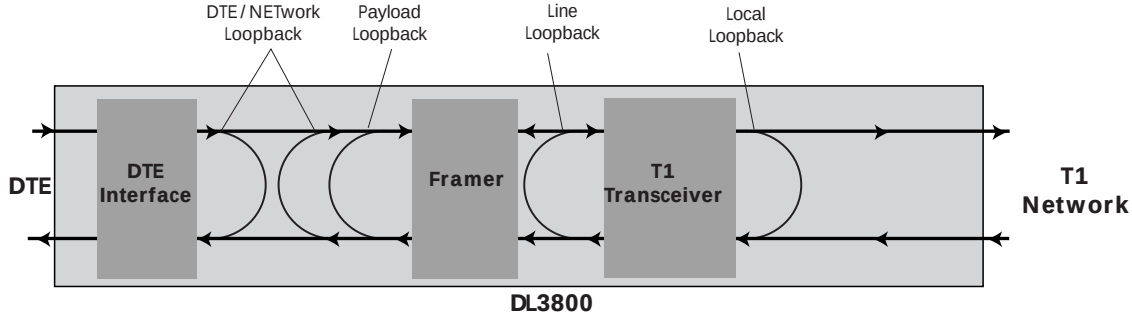


Figure 4-18 Loopbacks Within the DL3800

Manual Network Restoration

The DL3800's T1 ports are normally set to auto restore. However, you may choose to individually restore T1 networks after they fail, through the MANUAL NETWORK RESTORATION MENU.

NOTE: Manual restore will only work under the following conditions:

1. **If the port has previously been set to "Use w/manual restore," in the Network Configuration screen.**
2. **If the T1 is *not* in alarm. If the T1 is in alarm, you must first clear the alarm statistics in the STATISTICS MENU. To learn how to clear alarm statistics, see "Statistics" on page 4-8.**

To access the MANUAL NETWORK RESTORATION MENU (Figure 4-19), move the highlight bar to `MANUAL NETWORK RESTORATION` in the CONFIGURATION MENU, and press **`Enter`**.

```
Status 07/15/98 12:14:46  Unit:   75    NET : 1  (  9)
    This Net is Multiplexed to the DTE port
Idled  07/15/98 12:13:37  Unit:   75    NET : 1  (114)
    Network 15 Minute UAS Major Threshold Exceeded Idled
DIGITAL LINK DL3800   SR 3.00.04 NODE   75:Penguin      07/15/98 14:19:01
SELECTED DEVICE ADDRESS:   75.00.000  NAME: Penguin

MANUAL NETWORK RESTORATION     Exit  Confirm

PORT#  RESTORE
1      No Change
2      No Change
3      No Change
4      No Change
5      No Change
6      No Change
7      No Change
8      No Change
```

Figure 4-19 MANUAL NETWORK RESTORATION MENU

To manually restore a T1 port (network), use the up and down arrow keys to highlight the line item of the corresponding network port number. Toggle from `No Change` to `Restore` using the Space Bar. Select `Confirm`, and press the **`Enter`** key to save the changes.

Logout

This allows the user to manually logoff the unit, instead of waiting for the provisioned automatic logoff time for the unit to logoff automatically. Highlighting LOGOUT and pressing **Enter** logs the user off the system.

5 Front Panel Interface

General

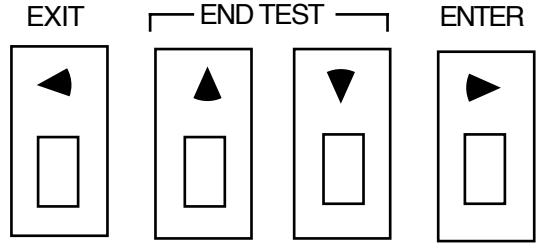
The front panel features a 16 character vacuum fluorescent display and four buttons that help the user to move through the various menus to configure the unit, perform tests, and obtain vital performance data. The front panel also features six LEDs for the DTE port, one for each of the T1 networks, three for the DL3800 status and one for Network Test.

Display Overview

The DL3800 has a 16-character fluorescent front panel display. The left most character often provides an indication when the displayed message relates to a remote unit. A remote unit message is indicated by the character R followed by a comma (R,). When displaying a message relating to the local unit, this character position is a blank.

BUTTON OVERVIEW

The DL3800 has four front panel buttons. The unit generally responds to a button when it is pressed. Pressing and holding a button results in a repeating action after one-half second.



The front panel buttons are also used for Alarm Cutout. When an alarm condition occurs, the External Alarm Output contacts close. This typically actuates external alarm indicators such as bells or alarm lights. Pressing any of the four front panel buttons clears the condition, and turns off the external bell or light.

Exit Button

The **EXIT** button is used to cancel operations or exit to a higher level menu loop from a sub-menu loop. This button doubles as a left arrow button in a few situations.

Up Arrow and Down Arrow Buttons

The up arrow button is used to move to the previous menu item or configuration option.

The down arrow button is used to move to the next menu item or configuration option.

Pressing both the up arrow and the down arrow buttons simultaneously (the End Test combination), terminates all active tests on the local unit and brings the front panel menu to the Test Menu showing the test that has just been terminated. If no tests are active, pressing the End Test combination has no effect.

Enter Button

The **ENTER** button is used to select a sub-menu loop or configuration option. This button doubles as the right arrow button in a few situations.

Front Panel LEDs

Table 5-1 Front Panel LEDs

Indication	Description
Test	Test In Progress LED
Off	No tests are in progress.
Solid Red	A test condition exists.
Data Port LEDs	
TD	Data DTE Activity LED. Represents pulses from DTE.
Green	Pulses are being detected.
Off	No pulses are being detected.
RD	Date DTE Activity LED. Represents pulses from DTE.
Green	Pulses are being detected.
Off	No Pulses are being detected.
RTS	Request to send indicator, from DTE.
Yellow	RTS from DTE is active.
Off	RTS has been removed.
CTS	Clear To Send indicator, to DTE.
Yellow	CTS to DTE is active.
Off	CTS has been removed, indicating that the DL3800 is not sending valid data.
DTR	Data Terminal Ready Indicator
Yellow	DTR from DTE is active.
Off	DTR from DTE is inactive.
Test	Indicates the port is in test mode. NOTE: The Test LED is off only when the port is not allocated bandwidth. It lights red when there is a HW DTE Loopback or DTE/NET Loopback in progress. It is connected to the TEST lead going from the DL3800E to the DTE, so both the LED and the lead carry the same data
Network LEDs (T-1 through T1-8)	
Red	Network is in Red Alarm.
Green	Network is Active and running.
Flashing Green	The network is ready, but there is no activity currently taking place.

Table 5-1 Front Panel LEDs (Continued)

Indication	Description
Yellow	Network is in Loopback.
Flashing Yellow	Receiving yellow/AIS alarm.
Unit LEDs: Status Maj Min	Display the status of the DL3800E, and whether the condition is a Major or Minor alarm. When a port's Active/Restore mode is set to `Never Use` and its alarm mode is set to `Mask`, then the activity LED will be turned off.

Access Levels And Protected Mode

Front panel access can be limited by placing the DL3800 in the Protected Mode. In this mode, the user can use the Front Panel User Interface only to monitor the status of the unit and its Error Counters, and view its configuration. The following operations cannot be performed through the Front Panel User Interface when the unit is in Protect Mode:

- Clearing the Error Counters.
- Changing the unit configuration.
- Starting or terminating diagnostic tests.

The unit can be put into and out of the Protected Mode through the Terminal User Interface, but not from the Front Panel User Interface. To place the unit in protect mode, toggle the Front Panel field to Off, in the Unit Configuration menu. Refer to "Unit Configuration" on page 4-13.

When a user needs to take a unit out of Protected Mode but a terminal is not available, the following procedure can be used:

1. **Turn off the power to the unit.**
2. **Turn the power to the unit back on.**

NOTE: The unit automatically performs a self test every time the unit is powered up.

This procedure takes the unit out of the Protected Mode (and clears any password that may have been programmed into the unit). To allow the user to perform this procedure when the unit is in protected mode, the

Protected Mode is ignored in the first sixty seconds after powering the unit up. When in Protected Mode, the Test Menu does not appear in the Main Menu as a choice.

POWER UP AND RESET

During power up initialization, the unit performs self test and displays a self-test message. Payload service resumes at the completion of Self Test. When the Self Test message is removed, the default message `DL3800 Inverse Multiplexer` appears on the display.

TOP MENU

NOTE: The menu system in the DL3800 is consistent with other Digital Link products. Therefore, a user familiar with an existing product can easily operate the DL3800. An example of a menu tree is shown below:

The Top Menu loop consists of five items: (1) DL3800 Inverse Multiplexer designation, (2) Select Remote/Local, (3) Monitor Menu, (4) Test Menu, and (5) Configuration Menu.

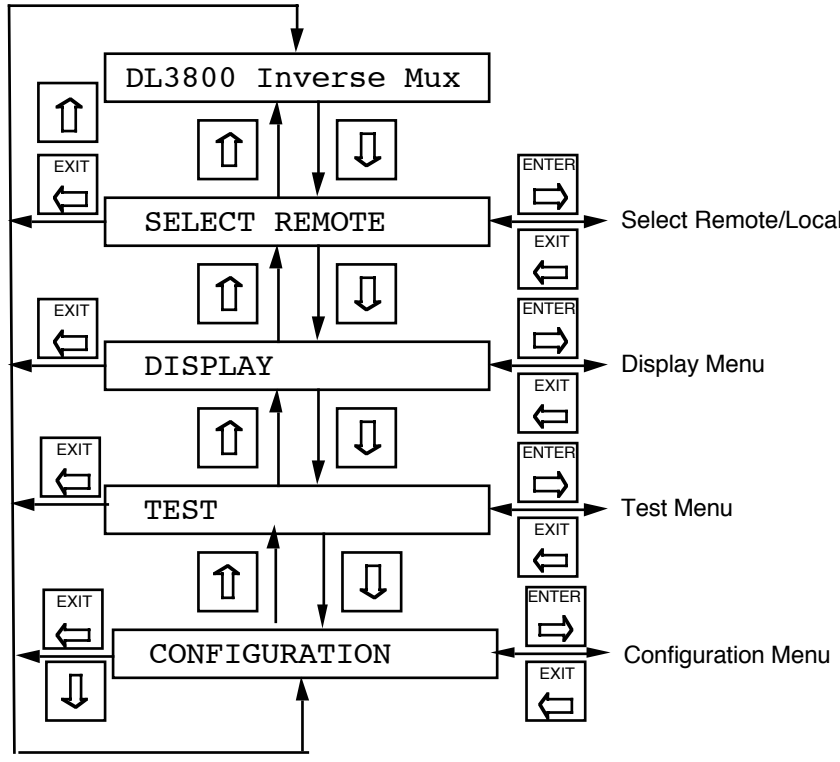


Figure 5-1 Front Panel Top Level Menu

This menu loop may also be entered at any time by pressing the **EXIT** button to go up the menu hierarchy until reaching the Top Menu. Continuing to press the **EXIT** button while in the Top Menu brings the unit to the default display `DL3800 INVERSE MULTIPLEXER` scrolling across the screen. Pressing the up and down arrows get the user into the menu loop. A menu is selected by pressing the **ENTER** button when the menu name appears on the display.

The Display Menu is used for displaying Node Status, DTE Status, and Status of each installed T1 network. The 24-hour line data is only available with the terminal interface or through the Network Manager. The data in the Display menu is a subset of the parameters that are available on the Alarm and Status Menu through the terminal interface, or the Network Manager.

The Test Menu is used for DTE and Network loopbacks. The DL3800 does not allow performing tests on the remote unit through the front panel user interface. This feature is only available with the terminal interface.

The Configuration Menu is used to view and change the unit's configuration parameters, date and time, network interface parameters, and DTE interface parameters.

Both the Monitor and Configuration Menus are also able to access the remote unit. Remote monitoring and configuration are only available when there is an ADL (*Application Data Link*) channel to the remote unit. When the user requests status or configuration information from the remote unit, the local unit sends a request to the remote unit over ADL, and waits for a reply. While waiting for the reply, the local unit displays the message:

```
PLEASE WAIT...
```

On the front panel. If there is no reply from the remote unit within 10 seconds, the display of the local unit will show:

```
REMOTE NOT AVAILABLE
```

Otherwise, the information reported by the remote unit will be displayed.

SELECT REMOTE / SELECT LOCAL

Pressing the Down Arrow cursor button when the default message is in the display brings the message `SELECT REMOTE` or `R, SELECT LOCAL` to the display. This allows the user to log onto either the local or remote DL3800.

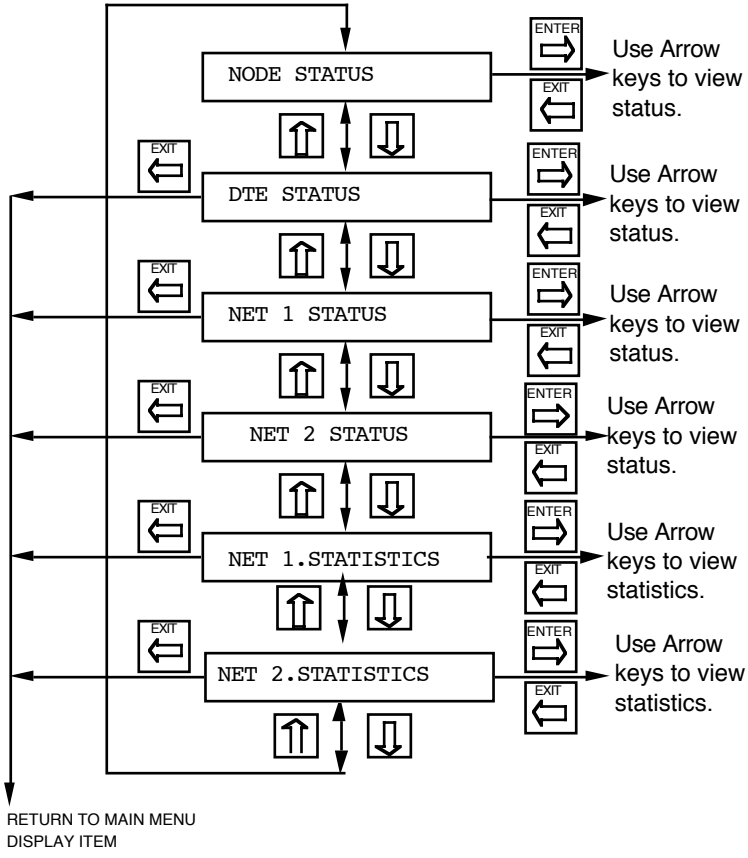
When logged onto the local unit, the display will read `SELECT REMOTE`. When logged onto the remote unit, the display will read `R,SELECT LOCAL`. To change the DL3800 being monitored and controlled, press the **ENTER** button. The message in the display will start blinking. Press the **ENTER** button once again to change from `SELECT REMOTE`, `R` or `SELECT LOCAL`.

NOTE: When logged onto the remote unit, an `R,` will appear as the first two characters in the display For example: `R,NET1 STATISTICS`

DISPLAY MENU

The DISPLAY Menu is used for displaying Node status, DTE status and the status of each installed T1 line. It is also used to clear the error counters (Clearing the error counters can only be done when the DL3800 is not in the Protected Mode).

DISPLAY MENU



NOTE: Only those T1 circuits physically installed (from two to eight) will have status lines in this menu.

Node (Common Equipment) Status

This display shows the status of the unit. NODE STATUS is accessed from the DISPLAY Menu by pressing **ENTER** when NODE STATUS appears in the display.

If one of more errors are detected, one or more of the following messages will appear. Use the up and down arrow buttons to view the following messages, see Table 4-2 on page 4-6 of this Users Manual for a list of those Common Equipment Alarm and Status items that could appear in this menu.

DTE Status

The next display shows the status of the DTE data port. The Menu is accessed by pressing **ENTER** when DTE STATUS appears in the display.

If errors are detected, one or more of the following messages will appear. Use the down and up arrow buttons to view further messages.

See Table 4-2 on page 4-6 of this Users Manual for a list of those Common Equipment Alarm and Status items that could appear in this menu.

NET (1-8) Status

The next eight displays show the status of the T1 Networks (NET 1 STATUS through NET 8 STATUS if all are installed). Use the up and down arrows to select the T1 Network to be monitored and press the **ENTER** button. Use the up and down arrow to view further status items relating to the same T1 circuit.

See Table 4-2 on page 4-6 of this Users Manual for a list of those Common Equipment Alarm and Status items that could appear.

NET (1 through 8) Statistics

The Menu provides the user with the various performance statistics of the individual T1 circuits. These performance statistics are listed and defined in Table 5-3. To view the statistics of a particular T1 circuit, press the **ENTER** button when the display reads `NET N.STATISTICS`, where N is the number of the desired T1 network port.

The following table lists and explains the information that can be viewed from the NET Statistics menu, for each performance statistic:

Table 5-2 NET Statistics Menu Information Display

Front Panel Display	Explanation
NET N XXX	XXX = the performance statistic. N = the T1 network port (1 through 8).

Table 5-2 NET Statistics Menu Information Display (Continued)

Front Panel Display	Explanation
SEC YYY VALID. Z	YYY = the number of seconds into the current interval. Z = the number of valid 15 minute intervals since the error counters were reset (0 through 96).
CUR. X	X = the current interval.
TOTL. X	X = the number of errors in the current interval.

Pressing the down arrow from any of these displays will step you through the last 96 15-minute intervals while displaying the number of errors in each of the interval. From the Net Statistics menu, press the **ENTER** button. When you see Net N CV, press **ENTER** again. The first display will read SEC. 455 VALID.8, showing the number of seconds in the current interval, and the number of valid 15 minute intervals since the error counters were last reset.

Pressing the down arrow button from this point in the menu will show the number of Code Violations in the current interval (CUR 4). Pressing the down arrow will display the total number of errors since the registers were last reset (TOTL. 8). Pressing the down arrow from here will cycle the user through the last 96 fifteen-minute intervals (or however many intervals exist since the counters were last reset), displaying the number of Code Violations in each interval, starting with the most recent, i.e., 1 = 0.

The NET STATISTICS items are listed in Table 5-3.

Table 5-3 NET Statistics Items

Parameter	Definition
CV	A code violation. CV is a count of Frame synchronization bit errors (FE) in the Super Frame (SF) format, or a count of the CRC-6 errors in the Extended Super Frame (ESF) format occurring during the accumulation period.
ES	An Errored Second (ES), in the case of ESF, is the count of one-second intervals containing one or more CRC-6 errors, or one or more CS events, or one or more SEF events. An SEF is a severely errored frame in which there are no LOS and no AIS events.
ES-A	In ESF format only, this is the count of one-second intervals with exactly one CRC-6, no SEF, and no LOS events.
ES-B	In ESF format only, this is a count of one-second intervals with no less than two and no more than 319 CRC-6 errors, no SEF events, and no LOS events.
SES	In ESF format, Severely Errored Seconds are defined as a count of one-second intervals with 320 or more CRC-6 errors, or an SEF defect. In SF, it is the count of one-second intervals with eight or more FE events or an SEF defect.

Table 5-3 NET Statistics Items (Continued)

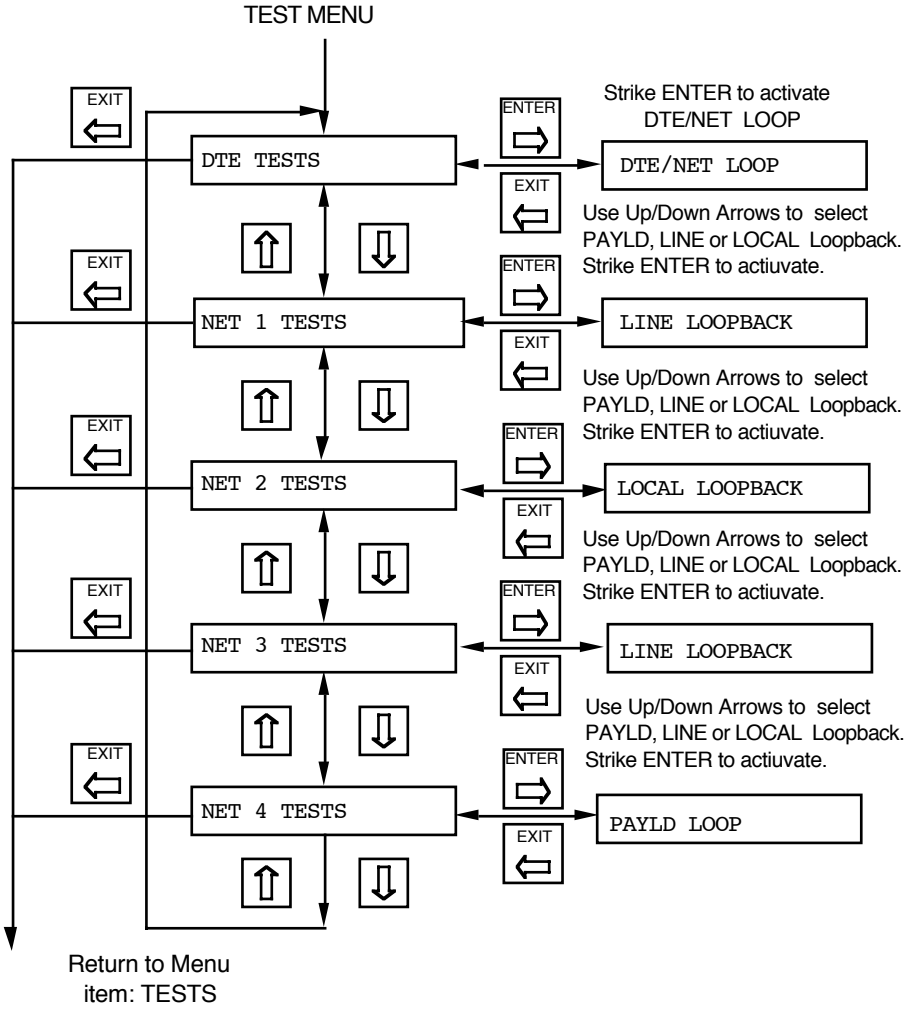
Parameter	Definition
SAS	In ESF only, this parameter is the count of one-second intervals containing one or more SEF defects or one or more AIS (Alarm Indication Signal) defects.
AISS	This parameter is a count of one-second intervals containing one or more AIS defects.
UAS	This is a count of one-second intervals in which the DS1 path has been unavailable. The DS1 path is determined to be unavailable from the onset of 10 continuous SESs, or the onset of the condition leading to a failure.
CSS	The Controlled Slip Second is a count of one-second intervals containing one or more controlled slips.
OOF	This is the number of seconds that the signal has been out of frame during the accumulation period. This counter is suppressed during an LOS condition. A total of 80 OOFs in a10-second sliding window will create a major alarm, and 5 OOFs in a 600 second sliding window will create a minor alarm.
BPV	This display provides the number of Bipolar Violations (BPV's) that have occurred during the accumulation period. A total of 15430 BPV's in a 10-second sliding window will create a major alarm, and 5 BPV's in a 600 second sliding window will create a minor alarm.
FE	This display provides a count of the number of seconds containing framing bits that have been in error during the accumulation period.
EFS	Error Free Seconds for a particular T1 network port (NET N EFS). Pressing the **ENTER** button when this is in the display will display the actual EFS percentage for that network port (EFS 99.6 PERCENT).
CLR STAT	NET N CLR STAT allows the user to clear all the statistic counters for that particular network port. To clear the statistics, press the **ENTER** button when NET N CLR STAT appears in the display window.

TEST MENU

The Test Menu is used to activate network loopbacks and DTE loopbacks. The Test Menu is only available when the unit is not in the Protected Mode. In Protected Mode, this menu is not included in the Top Menu loop. Tests are performed by selecting a test from the Test Menu or one of the Test sub-menus, and pressing **ENTER** . To end all tests, press the END TEST button combination (up and down arrow simultaneously). When a test is selected that could apply to a T1 port, the user is asked to specify to which fraction the test should apply. Only the local unit can be tested from the front panel. Testing the remote unit is limited to placing it in the Network Loopback Test.

The Test Menu is broken down into two types of sub-menus: DTE TESTS (one menu) and NETWORK TESTS (one for each network interface installed). Through these Sub-Menus, the user initiates and stops various tests and loopbacks.

The TEST Menu is accessed from the Main Menu by pressing **ENTER** when TEST appears in the display. Pressing the down or up arrow toggles through the three sub-menus. The Sub-Menus are accessed by pressing **ENTER** when the appropriate menu appears in the display.



NOTE: A menu item will appear only for those T1 network interfaces. installed.

DTE TESTS

Only one loopback can be initiated through the DTE TESTS Menu, a bi-directional DTE/NET Loopback.

To access the DTE TESTS Menu from the TEST Menu, press **ENTER** when DTE TESTS appears in the display.

When in the DTE TEST Menu, pressing **ENTER** accesses the DTE/NET Loopback.

DTE/NET Loopback

The DTE/NET LOOPBACK is a bi-directional loopback that loops the received DTE signal back to the DTE and the signal from the T1 Main Board back towards the T1 Main Board. This loopback is used to verify the operation of the DTE and associated cabling, the DTE Board, and the link between the DTE Board and the T1 Main Board.

To initiate a DTE/NET LOOP from the DL3800 front panel, press **ENTER** when DTE/NET LOOP appears in the display.

When a DTE/DTE LOOP is in operation, a "plus sign" will appear after DTE/NET LOOP in the display:

```
DTE/Net Loop    +
```

To end the loopback, press **ENTER** again while still in the DTE/NET LOOPBACK menu.

To cancel a test or loopback from any place in the Menu, press the **END TEST** button combination. However, this will cancel all tests and loopbacks currently in progress.

Only one test can be performed at a time. To start a new test, the previous test must first be terminated.

While a test is active and the user is in the Test Menu, the up arrow and the down arrow buttons are disabled, and the user can only view the name of the test that is currently active. The user can use the **EXIT** button to go out

of the Test Menu and then, using the other buttons, go into the Monitor or the Configuration Menus to view the performance information or view and change the configuration of the unit while the test is in progress.

While the test is active, the front panel **TEST** LED is on, reminding the user that the unit is out of normal service condition. The test is terminated by pressing the **END TEST** button combination at any point in the menus. When this combination is pressed, the currently active test is canceled and the front panel display returns to the TEST MENU to the test that was just terminated.

Network Tests (1 through 8)

Three NETWORK TESTS can be performed through this Menu, a PAYLOAD (PAYLD) LOOPBACK, a LINE LOOPBACK and a LOCAL LOOPBACK. To access NETWORK TESTS MENU from the TEST MENU, press **ENTER** when NETWORK TESTS MENU for a particular T1 circuit (NET 1 through NET 8) appears in the display.

When in the particular NETWORK TEST MENU, pressing the up arrow or down arrow toggles between the three options, PAYLD, LINE and LOCAL LOOPBACK.

Payload Loopback

The PAYLOAD LOOPBACK on the DL3800 is used to verify the proper operation of the T1 network and the DL3800.

To initiate a PAYLOAD LOOPBACK from the DL3800, press **ENTER** when PAYLD LOOPBACK appears in the display for the T1 (NET 1 through NET 8) line to be looped back.

When a PAYLOAD LOOPBACK is in operation, a plus sign will appear after the words PAYLD LOOPBACK in the display.

```
Payload Loopback    +
```

When the loopback is terminated, the "plus sign" disappears.

To end the loopback, press **ENTER** again while still in the PAYLD LOOPBACK MENU.

Line Loopback

The network loopback is used to verify the operation of the T1 network connection (T1 through T8). The network loopback loops the data received from the T1 network back towards the network. The data is regenerated prior to being looped back, however, no additional processing of the data is performed by the DL3800. This minimizes the impact of the DL3800 during this test so that the problems can be isolated.

To initiate a LINE LOOPBACK from the DL3800, press the **ENTER** button when `LINE LOOPBACK` appears in the display.

When a Line Loopback is in operation, a "plus sign" will appear after the words `LINE LOOPBACK` in the display as shown below:

```
Line Loopback    +
```

To end the loopback, press **ENTER** again while still in the LINE LOOPBACK MENU. When the loopback is terminated, the plus sign disappears.

Local Loopback

The local loopback is used to verify the operation of the DTE and connections. The local loopback loops the data received from the DTE back towards the DTE at the network interface.

To initiate a LOCAL LOOPBACK from the DL3800, press the **ENTER** button when LOCAL LOOPBACK appears in the display.

When a LOCAL LOOPBACK is in operation, a "plus sign" will appear after the words LOCAL LOOPBACK in the display as shown below:

```
Local Loopback   +
```

To end the loopback, press **ENTER** again while still in the LOCAL LOOPBACK MENU. When the loopback is terminated, the "plus sign" disappears.

You can cancel a test or loopback from any place in the Menu by pressing the up arrow and down arrow at the same time. However, this will cancel all tests and loopbacks currently in progress.

CONFIGURATION MENU

The CONFIGURATION MENU is used to back up the database and to view and change the unit and Comm Port Configuration parameters, network interface parameters, and DTE interface parameters. The remote unit configuration may also be viewed and changed.

The DL3800 configuration can only be changed when the unit is not in the Protected Mode. In Protected Mode the configuration can only be viewed but not changed. To use the CONFIGURATION MENU, the user selects the CONFIGURATION SUB-MENU from a hierarchical list, and presses the **ENTER** button. The user then proceeds through the hierarchical menu structure to view or change the chosen parameters. When the user is done using the CONFIGURATION MENU, the **EXIT** button is pressed.

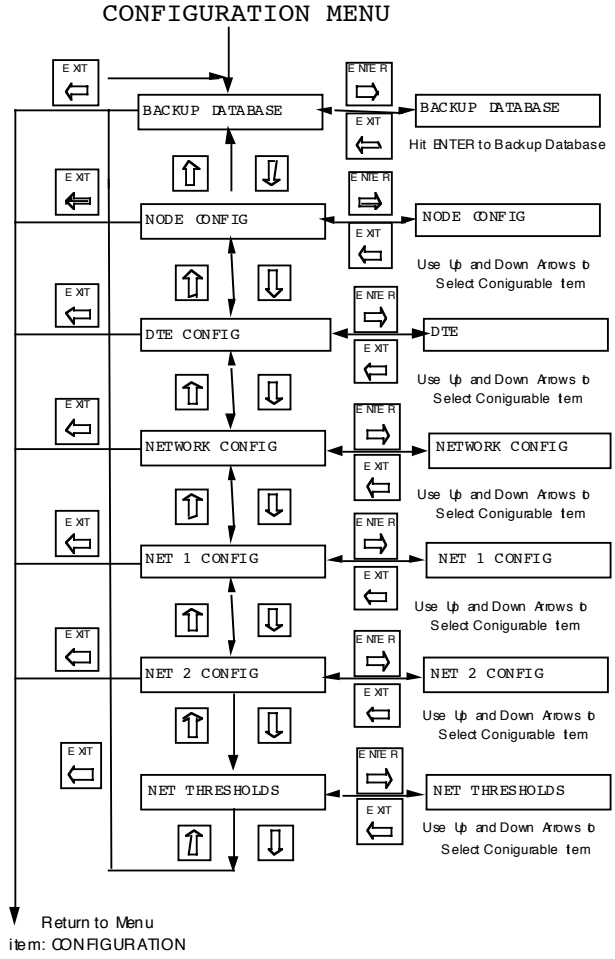


Table 5-4 CONFIGURATION MENU Items

Menu	Definition
NODE CONFIG MENU	Used to set the unit's ID, date, time, and communications port. It also shows the user the hardware and software versions

Table 5-4 CONFIGURATION MENU Items (Continued)

Menu	Definition
Backup Database	Used to manually back-up the database to EEPROM
DTE CONFIG MENU	Used to set the line mode for the DTE DATA port. It is also used to define whether the DTE signal is defined missing when the DTR and the RTS line is not asserted. Other options include DTE/DCE mode, V.35/RS449, and clocking option (SCTE/SCT Normal or SCT Invert)
NETWORK CONFIG MENU	Used to set the operating mode (Inverse Mux or Single Line DSU), and clocking options of that are common to all T1 Network Ports.
NET N CONFIG MENU	Used to set various configurable items that are unique to each individual T1 Network Port, including Framing Format, Line Code, Alarm Reporting, Auto-Restore, and Equalization.
NET THRESHOLDS MENU	Allows the user to enable/disable and set the values of the various Network Alarm Thresholds which, when exceeded, will cause the T1 lines to automatically be taken out of service.

Node Configuration

The NODE CONFIG MENU allows the user to configure the NODE ID, NODE NUMBER, DATE & TIME and *NODE COMM PORT (Terminal). It also displays the NODE HW REV and the SOFTWARE REV, which are set by the factory.

NOTE: Only the terminal comm port can be set through the front panel. The network management port is set through the ASCII terminal.

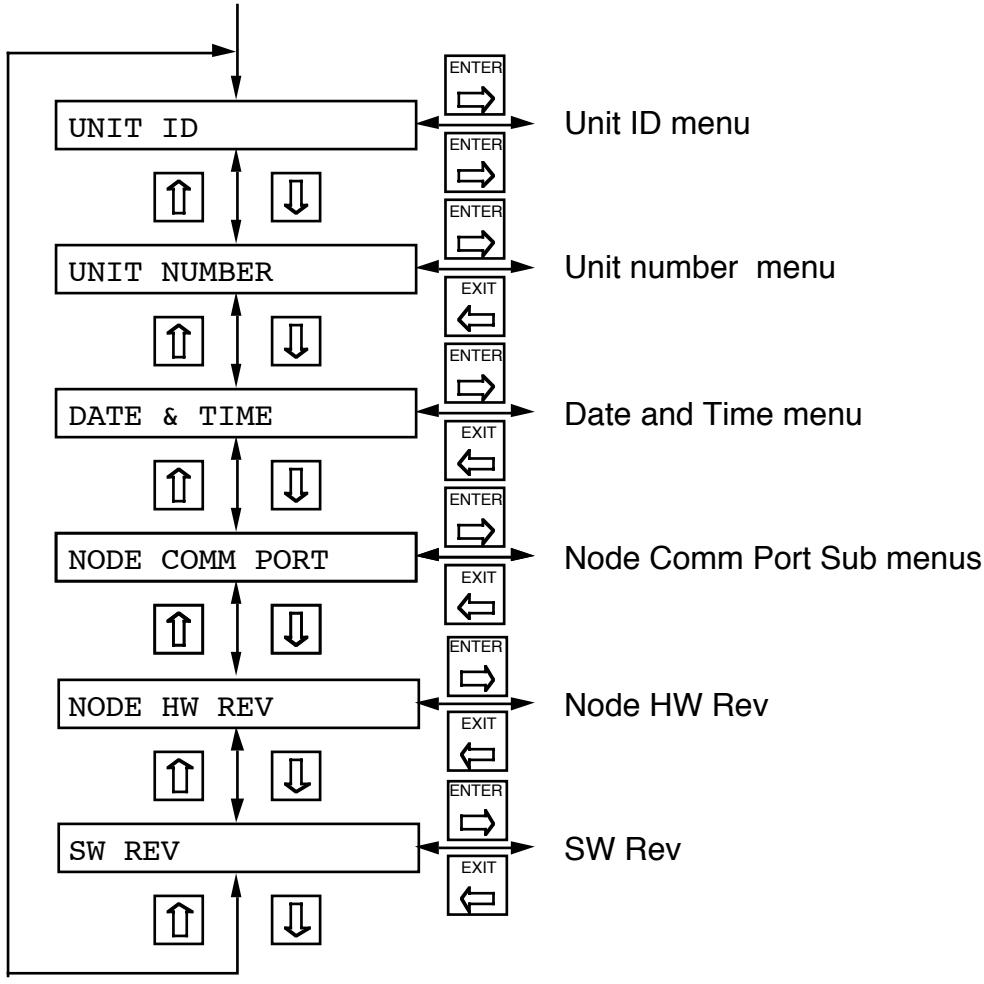
The NODE CONFIG MENU is accessed through the CONFIGURATION MAIN MENU by pressing **ENTER** when NODE CONFIG appears on the display. Pressing the down arrow or up arrow toggles through the Sub-Menus.

Pressing **ENTER** when a selection is in the display allows the user to view the present configuration. Pressing **ENTER** again will cause the entry to start blinking and allows the user to change the selection if desired.

To change the selection, use the down arrow and up arrow buttons to toggle through the choices. Pressing **ENTER** selects the option that's in the display as the configuration. In the case of changing names and numbers, only one number or letter will "blink" at a time. Only that number or letter can be changed. After each letter or number is selected, press **ENTER** to

confirm each change. The next letter or number space will then begin "blinking" and be available for change. To abort any change, press **EXIT** before you press **ENTER** .

NODE CONFIGURATION Menu



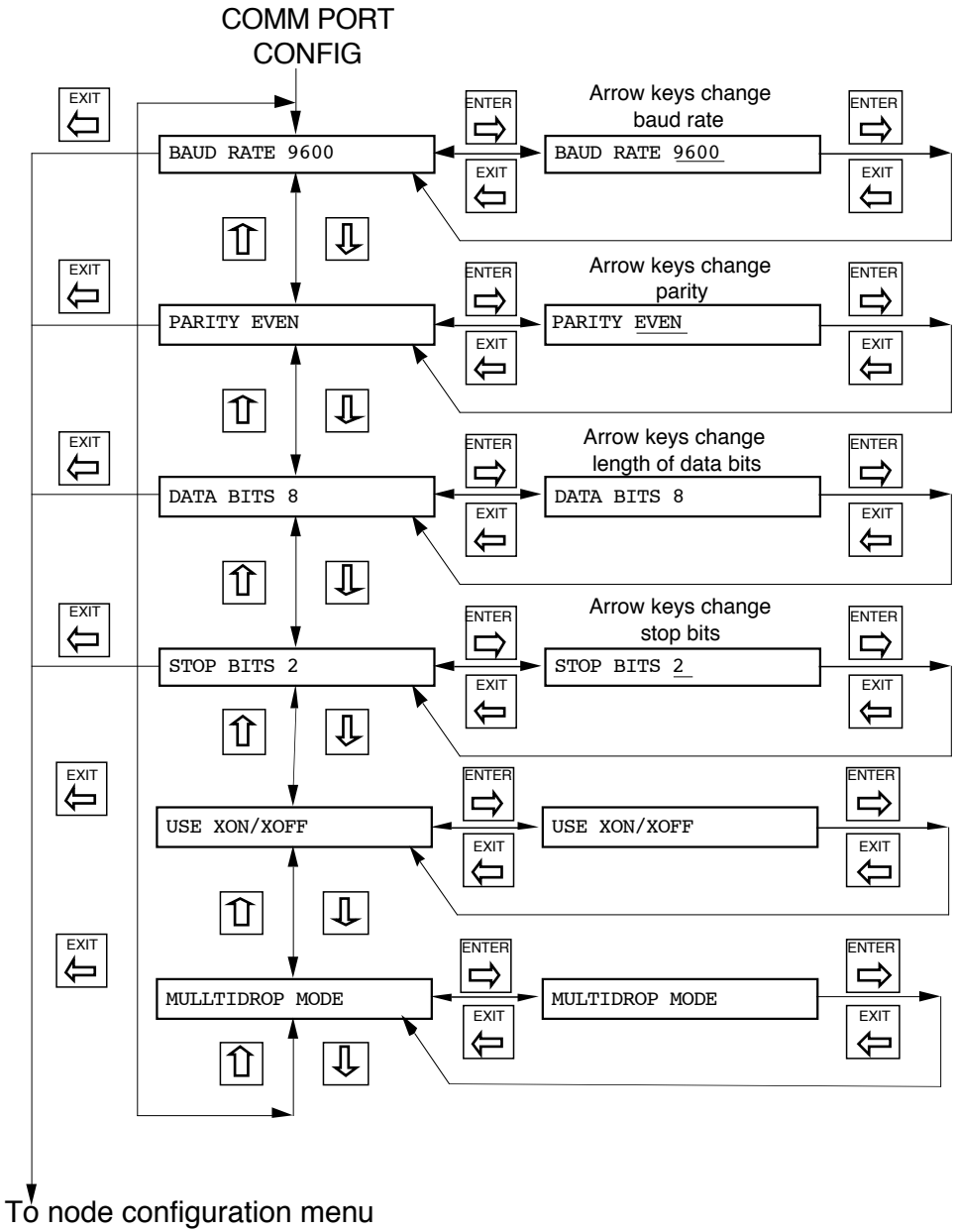
The NODE CONFIGURATION MENU is used to configure various parameters of the DL3800, including:

Table 5-5 NODE CONFIGURATION MENU Items

Parameter	Definition
Unit ID	The Unit ID is an alphanumeric designation up to 16 characters in length. The unit is shipped without a Unit ID. To access Unit ID from the NODE CONFIGURATION MENU, press **ENTER** when Unit ID appears in the display. Press **ENTER** again, and the first space or letter will begin blinking. Use the up and down arrows to select the desired letter or number. Press **ENTER** again to confirm the selection, and move on to the next letter or number
Unit Number	The Unit Number is a four digit number. The unit is shipped from the factory without a number. To access the Unit Number, press **ENTER** when Unit Number appears in the display. To enter or change the Unit Number, follow the same steps as in entering the Unit ID.
Date & Time	The Date & Time are set at the factory, PST. They appear in the display as: June 07, 1998 09:44:49 To change the Date & Time, follow the procedure described under "Node Configuration".
Node Comm Port	The following communications port parameters can be set through this display: Baud Rate, Parity, Data Bits, Stop Bits, Flow Control, and Multidrop Mode.
Baud Rate	The BAUD RATE MENU is accessed through the NODE COMM PORT MENU. When the menu is first displayed, it will show the present Baud Rate: 38,400, 19,200, 9600, 4800, 2400, 1200, 600, or 300.
Parity	The PARITY MENU is accessed through the NODE COMM PORT MENU. When the menu is first displayed, it will show the present Parity: either No, Odd, or Even.
Data Bits	The DATA BITS MENU is accessed through the NODE COMM PORT MENU. When the menu is first displayed, it will show the present Data Bits configuration, either 1, 1.5, or 2.
Stop Bits	The STOP BITS MENU is accessed through the NODE COMM PORT MENU. When the menu is first displayed, it will show the present Stop Bits configuration: either 1, 1.5, or 2.

Table 5-5 NODE CONFIGURATION MENU Items (Continued)

Parameter	Definition
Local Terminal XON/XOFF	With the Flow Control feature On, the terminal can request that the DT quit sending data when its buffers are full. The choices are Use or Ignore XON/XOFF
Terminal Multidrop	If the local terminal is connected to more than one DL3800, it must be in Multidrop Mode. If it is connected to only one unit, this feature can be disabled. When it is disabled, the system comes up directly, without the user having to log in. The choices are Multidrop Mode and Direct Terminal.



Note that both the NODE HW (HARDWARE) REV and the NODE SW (SOFTWARE) REV are set at the factory and cannot be changed.

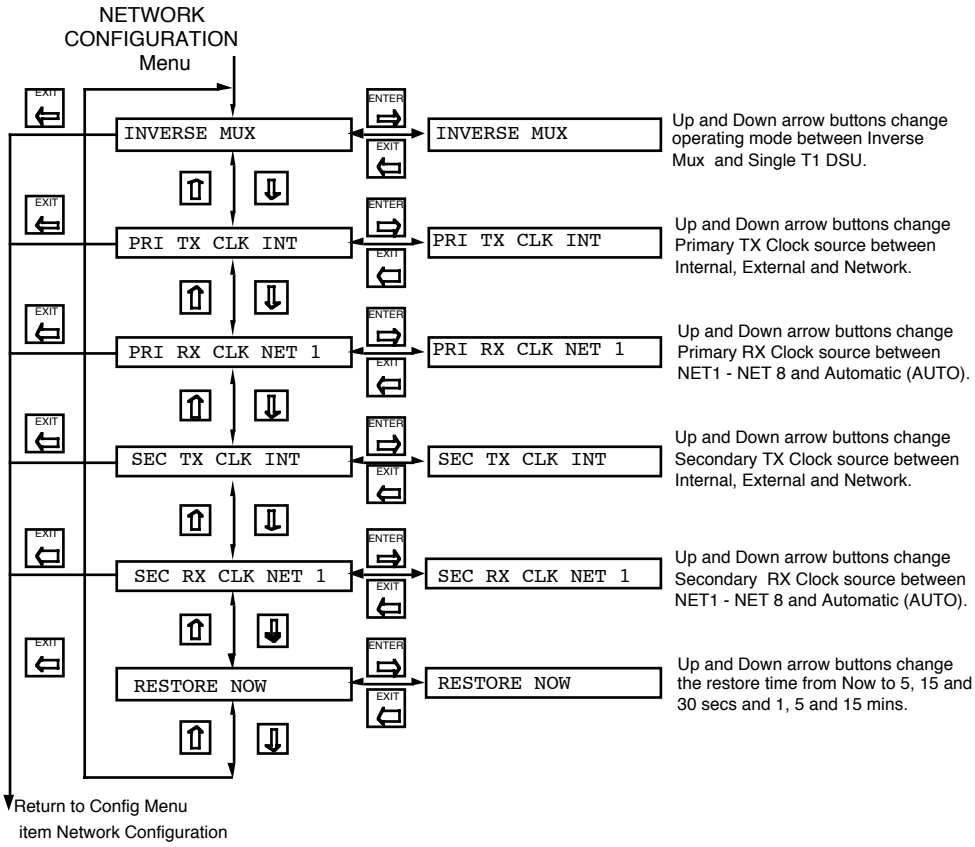
DTE Configuration Menu

This menu allows the user to set various configurable items for the DTE port.

For each item on this menu, pressing the **ENTER** button causes the configurable item to start flashing. Pressing the up arrow and down arrow buttons changes the value of the flashing item. Pressing the **ENTER** button again terminates the configuration of that item. Pressing the **EXIT** button aborts the operation without making the change. Each of the Configurable items are described in detail in "Network Thresholds" on page 5-24 of this User Manual.

Network Config

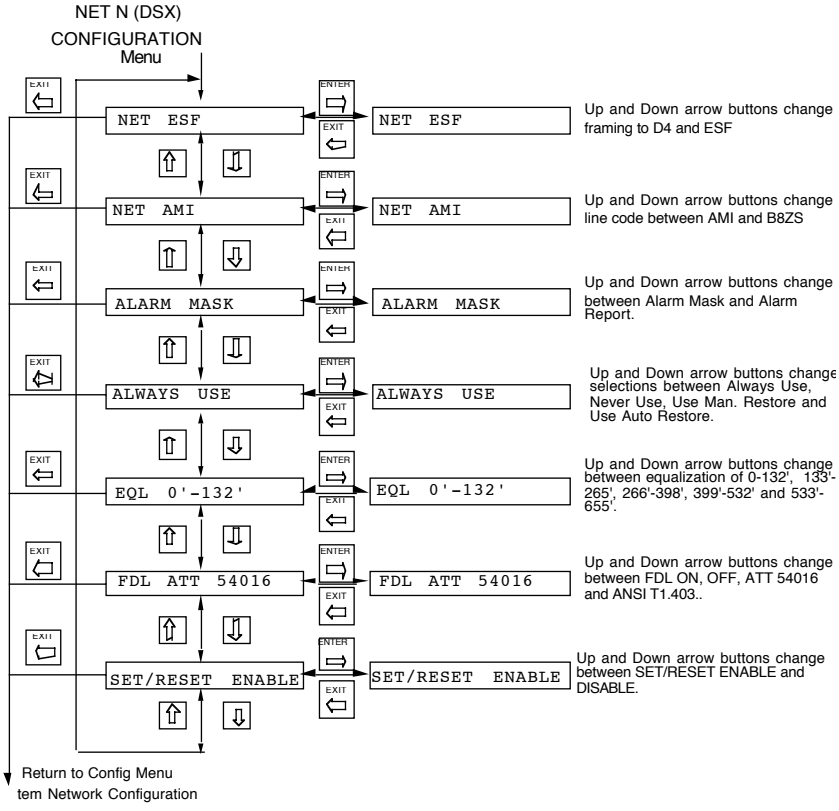
The NETWORK CONFIG MENU allows the user to change various configurable items common to all T1 network ports. For each item on this menu, pressing the **ENTER** button causes the configurable item to start flashing. Pressing the up arrow and down arrow buttons changes the value of the flashing item. Pressing the **ENTER** button again terminates the configuration of that item. Pressing the **EXIT** button aborts the operation without making the change. Each of the Configurable items are described, along with the various options, in detail in "Network Configuration" on page 4-18 of this User Manual.



NET *N* Config

The NET*N* CONFIG MENU allows the user to change various configurable items common to all T1 network ports. As with the front panel configuration, the menus differ slightly depending on whether the unit is configured for DSX or CSU operation. The two menus are shown in the following two figures.

For each item on this menu, pressing the **ENTER** button causes the configurable item to start flashing. Pressing the up arrow and down arrow buttons changes the value of the flashing item. Pressing the **ENTER** button again terminates the configuration of that item. Pressing the **EXIT** button aborts the operation without making the change. Each of the Configurable items are described in detail in "Network Configuration" on page 4-18 of this User Manual.



NETWORK THRESHOLDS

This menu allows the user to enable/disable the automatic FALLBACK feature and set the various Network Alarm Thresholds that will cause the T1 lines to automatically be taken out of service.

Three levels of thresholds can be turned On or Off, and values set through this menu: CON (CONSECUTIVE), 15-minute, and 24-hour. Thresholds can be set for the number of Consecutive seconds (1-100) containing errors, for the number of seconds containing errors in a 15-minute interval (1-900), and for the number of 15-minute intervals containing errors in a 24-hour period (1-96).

The user can set the threshold value for Minor (MI) and Major (MJ) alarms, where exceeding the Minor alarm threshold will generate an alarm report and the exceeding a Major alarm threshold will actually cause a T1 line to be automatically taken out of service.

Pressing the **ENTER** button when NET THRESHOLDS appears in the display screen will start the menu and allow the user to scroll, using the down or up arrow buttons, through the following options:

Table 5-6 NET THRESHOLD Options and Values

OPTION	VALUE
CON CRCS	010
CON CRCS	OFF
CON SES	010
CONSES	ON
CON UAS	015
CON UAS	OFF
15.MIN.MI.BPV	100
15.MIN.MJ.BPV	100
15.MIN.MJ.BPV	OFF
15.MIN.MI.CRCS	100
15.MIN.MJ.CRCS	100
15.MIN.MJ.CRCS	OFF
15.MIN.MI.ES	100
15.MIN.MJ.ES	100
15.MIN.MJ.ES	OFF
15.MIN.MI.SES	100
15.MIN.MJ.SES	100
15.MIN.MJ.SES	OFF
15.MIN.MI.UAS	100
15.MIN.MJ.UAS	100
15.MIN.MJ.UAS	OFF
24.HR.MI.BPV	10
24.HR.MJ.BPV	10
24.HR.MJ.BPV	OFF

Table 5-6 NET THRESHOLD Options and Values (Continued)

OPTION	VALUE
24.HR.MI.CRCS	10
24.HR.MJ.CRCS	10
24.HR.MJ.CRCS	OFF
24.HR.MI.ES	10
24.HR.MJ.ES	10
24.HR.MJ.ES	OFF
24.HR.MI.SES	10
24.HR.MJ.SES	10
24.HR.MJ.SES	OFF
24.HR.MI.UAS	10
24.HR.MJ.UAS	10
24.HR.MJ.UAS	OFF

To turn a Major Alarm ON or OFF, use the Up and Down arrows to get the specific alarm in the display window and press **ENTER** . Using the arrow buttons, select ON or OFF. To change an alarm threshold value, use the Up and Down arrow buttons to get to that particular alarm and press **ENTER** . Use the Up or Down buttons to raise or lower the value.

6 Diagnostics

Equipment Return And Repair

If faulty equipment is suspected, perform the tests in this section. If, after performing these tests, the DL3800 or any associated module is suspected to be faulty, call Digital Link Technical Support at (408) 745-4200.

Running Diagnostic Tests

You should test the DL3800 before you use it. If it, or an associated module, does not operate properly during or after testing, call Digital Link Technical Support at: (408) 745-4200.

This chapter contains procedures for testing the DL3800 followed by suggestions for troubleshooting problems.

You use the DTE AND NETWORK TESTS MENU to initiate and terminate one DTE test and three network tests. The four tests are:

- DTE/NETWORK Loopback
- Payload Loopback
- LINE Loopback
- LOCAL Loopback

NOTE: You do not need to inform the telephone company that you're running the tests. However, if the tests reveal a problem with a carrier's service or with the DL3800, you should inform the carrier that the DTE equipment or the DL3800 must be removed from service.

To initiate a loopback test in the DTE AND NETWORK TESTS MENU, select TESTS from the INVERSE MULTIPLEXER MAIN MENU, and press **Enter** to open the menu.

Select a test on a specific network port, set to ON, select CONFIRM, and press **Enter**.

To terminate or cancel the test, select it, set to OFF, select CONFIRM, and press **Enter**.

The example in Figure 6-1 shows the TEST MENU.

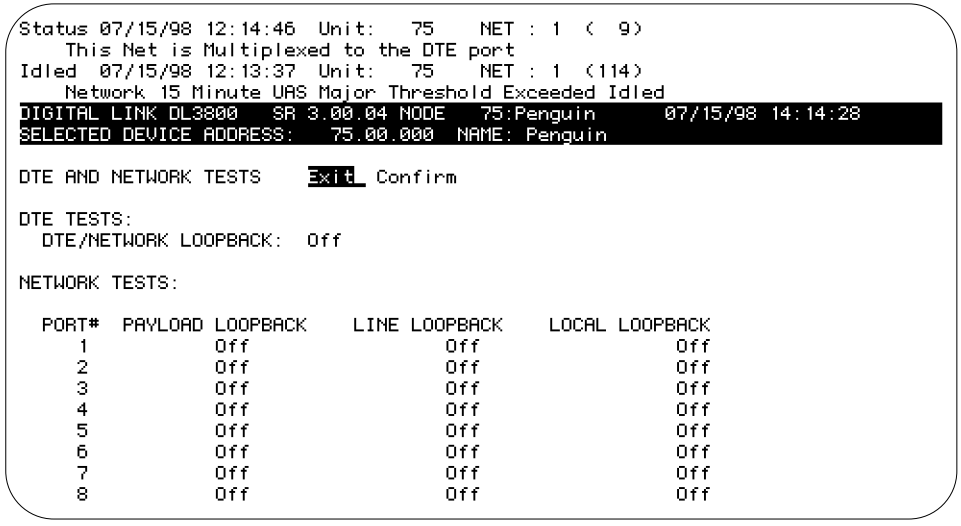


Figure 6-1 TESTS MENU

NOTE: The following 3 tests interrupt payload traffic to the unit.

DTE/Network Loopback Test

Use the DTE/NETWORK Loopback test to verify the data port and associated cabling. This bi-directional loopback loops the received data port signal back to the data port and the received T1 processor signal back to the T1 network. It can test a problem whose source is the T1 line.

LOCAL Loopback Test

Use the LOCAL Loopback test to verify the operation of the DL3800 data port and its connections.

To receive valid test data at the DTE device, run LOCAL Loopback on all active T1 ports.

Payload Loopback and Line Loopback Tests

Use the PAYLOAD Loopback and LINE Loopback tests to verify the proper operation of the DL3800 and selected T1 networks.

Both tests loop the payload data received from the T1 network back to the network.

With the PAYLOAD Loopback, the DL3800 regenerates the data and inserts a new framing pattern before it loops back the data. This verifies the unit's T1 framing and the T1 network.

With the LINE Loopback, the DL3800 does not do any additional processing of the data before it regenerates it and loops it back. This minimizes the involvement of the DL3800 during this test so that problems can be isolated to the network.

Possible Sources of Problems

The PAYLOAD Loopback can test a problem whose source may be the DL3800.

The LINE Loopback can test a problem whose source may be the Telco T1 line, wiring between the Telco demarcation points, the DL3800 at one or both ends, or the cable between the T1 line reporting errors and the DL3800.

The TEST LED on the DL3800 turns red during the tests, and the T1 port LED turns yellow.

TROUBLESHOOTING THE DL3800

This section describes problems you may encounter on the DL3800 and suggests ways you can troubleshoot them.

The troubleshooting procedure is designed to isolate the faulty or malfunctioning item to the T1 network, the DTE equipment, the cable from the DTE to the DL3800 or the DL3800 itself. The built-in diagnostic features of the DL3800 aid the user in quickly identifying and isolating faults.

Using the front panel buttons and display, the ASCII terminal or SNMP workstation, the user can run a series of loopback tests. Verification of the proper functioning of the DTE equipment and the DL3800 is accomplished through DTE loopback and a self test. Testing for the proper functioning of the remote DL3800 is accomplished by a Line loopback.

It is also possible to verify the path from the DTE through the T1 line to the remote-end DL3800, provided the DTE equipment can generate and detect looped back bit streams.

These suggestions can help determine which portion of the network might be at fault. When discovering a failure, check the simple solutions first. Is the power turned on? Is the equipment set up and configured properly? Will swapping cable pairs solve the problem?

The DL3800 is equipped with alarms that alert the user to the existence of possible problems with the unit, and received signals from the DTE or network. LEDs on the Module provide a quick indication of the status of that module: green light indicates everything is functioning normally; **yellow** light means the module is powered, configured and ready to be put into service.

Table 6-1 Troubleshooting *(1 of 5)*

Problem	Solution
DL3800 doesn't power up.	If the DL3800 is AC powered, make sure it is plugged into a live AC outlet. If it is DC powered, make sure the respective DC leads are not crossed. Check all fuses for opens, replace as needed. If the DL3800 blows fuses continuously, call Digital Link Technical Support.
You cannot communicate with the remote DL3800.	Make sure both units are in Inverse Mux mode, not Single T1 DSU. Verify that the local and remote units have unique ID's. If a DTE device is not connected at either end, set DTE LOSS to None. For HSSI operation, a DTE device must be connected at each end. If you must communicate with the remote unit before the DTE devices are connected, switch to V.35 operation, and set DTE LOSS to None. Make sure your T1 port LED's are solid green, indicating that the circuits are up and running.
The TEST LED on the DL3800 is constantly on.	Make sure no tests are being initiated, and check the TEST display from a terminal. If a test is running, end it by selecting the test and set it to Off in the DTE and NETWORK TESTS MENU Make sure the DTE device or the T1 carrier is not sending loop up and loop down codes.

Table 6-1 Troubleshooting *(2 of 5)*

Problem	Solution
The NETWORK T1 port LED's on the DL3800 never illuminate.	Make sure the T1 cable from your service provider is connected to the DL3800. Remove the T1 cable from the affected T1 port, and hardloop the interface by connecting pins 1-3 and 9-11 of the DB-15 port. If the T1 LED lights up, check your T1 cabling, and contact your service provider.
The NETWORK T1 LEDs on the DL3800 are constantly red.	Check each T1 port configuration to make sure the framing and line code are what the carrier is providing. Check each DL3800 for excessive errors. Check the T1 cabling or inside wiring for possible problems. Verify with the service provider that the local Smart Jack is not looped up. Perform the hardloop procedure on the affected T1 port to verify that the T1 port is functioning on the unit.
The NETWORK T1 LEDs are constantly yellow.	Make sure no tests are being initiated on the affected T1ports. Individual T1 port tests cause the T1 LED to turn yellow. If a test is running, end it by selecting the test, and setting it to Off in the DTE and NETWORK TESTS MENU. Verify the DTE device or the T1 carrier is not sending loop up and loop down codes.
The NETWORK T1 LEDs are flashing yellow.	Check the CURRENT ALARMS AND STATUS ITEMS MENU to see if the unit is receiving a T1 yellow alarm or transmitting an Alarm Indication Signal (AIS). Make sure the remote unit is receiving a valid T1. If it is not, it will transmit a yellow alarm. Make sure a valid DTE device is connected to the DL3800, and is powered on. If a DTE device is not connected and DTE LOSS is set to DTR or RTS, the DL3800 transmits an AIS to the remote unit.

Table 6-1 Troubleshooting *(3 of 5)*

Problem	Solution
The NETWORK T1 LEDs on an DL3800 are flashing green.	Make sure a valid DTE device is connected to the DL3800, and is powered on. If no DTE device is connected and the unit is configured for V.35 or RS449, make sure that DTE LOSS is set to None. If the unit is configured for HSSI, check for a valid HSSI signal (TA and DTR). If a DTE device is connected, make sure all DTE port LEDs are on. Check the CURRENT ALARMS AND STATUS ITEMS MENU to make sure no alarm thresholds have been exceeded. A T1 circuit is taken out of service for a configured amount of time if Fallbacks (in Network Alarm Thresholds) or Second Error Restoral Interval (in Network Configuration) is enabled, and a threshold has been exceeded. Make sure that the correct T1 cable is connected to the correct T1 port. You must restore the T1 line manually if it is configured for use w/Manual Restore (in Network Configuration), and a threshold or alarm condition has been exceeded.
The DTE port LED's on the DL3800 do not illuminate.	Make sure the correct DTE cable is securely attached to both units, and the connected DTE device is actually passing traffic. If the connected DTE device does not support the RTS or DTR leads, configure the DTE LOSS for None. This asserts the CTS lead from the DL3800. Make sure the DL3800 is configured for the correct electrical signaling from the DTE device: V.35, RS449, or HSSI.
The UNIT Major and Minor Alarm LEDs on the DL3800 do not clear.	Alarm thresholds may have been exceeded for the 15 minute or 24 hour periods. If other thresholds have not been exceeded, the DL3800 automatically clears these alarms after the period has passed.

Table 6-1 Troubleshooting *(4 of 5)*

Problem	Solution
The connected DTE device shows intermittent errors.	Run a DTE/NET Loopback to verify the physical connection between the local DTE device and the DL3800. If errors are reported during this loopback, check the DTE cable. Make sure the DTE device supports the DTE port clocking option. Use SCTE clocking for the DTE device if the application is using V.35, and the DL3800 has more than four connected T1 circuits. Make sure the DTE device can handle the set DTE clocking speed.
The T1 ports on a DL3800 cannot be put into network loopback from the carrier.	Make sure the carrier is sending a standard loop up code of 10000 to the T1 port. Make sure SET/RESET is enabled for each T1 port in the NETWORK CONFIGURATION MENU.
The DTE/NETWORK Loopback does not work towards the locally connected DTE device.	Make sure the DTE device can run to a DCE in loopback. If configured for SCTE, the DTE device must be able to recognize an inverted clock. If it does not, set the clocking to SCT. Make sure the DTE device does not need to see RLSD (RECEIVE LINE SIGNAL DETECTED) during this loopback. If it does, set RLSD in the DTE CONFIGURATION MENU to ASSERT this lead.
The DL3800 has timing and synchronization problems.	Make sure the timing source is set properly. If the clock source is provided by the circuit provider, set XMT PRIMARY CLOCK SOURCE to Net, and RCV to the T1 network providing the clocking. If the clocking is expected from a specific T1 circuit but the circuit is not in service, set XMT PRIMARY CLOCK SOURCE to AUTO. If the clock source is not provided by the circuit provider, set XMT PRIMARY CLOCK SOURCE to INT and the remote unit XMT PRIMARY CLOCK SOURCE to NET, and RCV to AUTO. Make sure the proper T1 cables are plugged into the corresponding ports on the DL3800.

Table 6-1 Troubleshooting *(5 of 5)*

Problem	Solution
You cannot access the DL3800 from a terminal.	The terminal must be running a VT100 or compatible terminal emulation program. Make sure you are using a straight through cable with pin 8 CTS cut at the terminal end. Make sure the Comm Port parameters match the terminal's, and the DL3800 has a unique ID. If the DL3800 is in a daisy-chain, you can display a roll call of all unit numbers by pressing **`Ctrl-x`** five times.

A Specifications

T1 Network Interface

Parameter	Setting
Interface Type	DSX-1 Standard T1 CSU Optional
Number of Ports	2, 4, 6 or 8
Framing Formats	D4 or ESF
ESF FDL Protocols	AT&T 54016 ANSI T1.403
Line Code	AMI or B8ZS
Transmit Line Rate	1.544 Mbps ± 50 ppm
Receive Line Rate	1.544 Mbps ± 135 ppm
Synchronization	Internal, Loop-timed, or External
Network Connector	DB-15 Socket

External Clock Interface

Parameter	Setting
Rate	1.544 MHz ± 50 ppm
Connector Type	DE-9
Input Impedance	10K Ω
Input Voltage	±7 V per RS-422 Standard

DTE Interface

Item	Interface
Electrical Interface	HSSI or V.35/RS-449
Rate	Up to 12.224 Mbps
Connector Types	DB-25 Socket (V.35/RS449) 50-pin Socket Amplimite (HSSI)
Number of Ports	One

COMM Port

Item	Interface
Interface Devices	Terminal or Modem
Protocol	User-friendly menu driven
Electrical	RS-232 socket

NMS Port (SNMP)

Item	Interface
Interface Devices	SNMP Manager
Protocol	SNMP (UDP/IP) over SLIP
Electrical	RS-232 socket

FRONT PANEL

Item	Interface
Display	16 Character Alphanumeric
Key Pad	Four Keys
DTE Status LEDs	TD, RD, RTS, CTS, DTR, network data/test, T1-1 through T1-8, status, MAJ alarm, MIN alarm

DIAGNOSTICS

Item	Interface
Loopbacks	DTE/Network, Payload, Line, Local
Self Test	Checks Unit Circuitry and Memory on power up
Alarms	Relay, dry contact

POWER

Power	Setting
AC Input	110 VAC, 0.5 A Max to 240 VAC, 0.25 A Max Autoranging
DC Input (Optional)	-48 VDC to -72 VDC
Power Consumption	40 W Max

ENVIRONMENTAL

Item	Temperature
Operating Temperature	0^{O}C to 50^{O}C
Storage Temperature	-20^{O}C to 60^{O}C
Relative Humidity	0 to 95% Non-Condensing
Altitude	-200 ft to 13,500 ft (-60.1 m to 4.1 m) above sea level

PHYSICAL / CONNECTORS

Item	Dimensions
Mounting	19-inch or 23-inch rack mounting or Standalone
Dimensions	17.2 in W x 2.8 in H x 11in D (43.7 cm W x 7.1 cm H x 27.9 cm D)

B Pinouts

TERMINAL CONNECTION

Table B-1 COMM and NMS Port Pin Assignments

PIN	SIGNAL
2 SD	Send Data to Terminal
3 RD	Receive Data from Terminal
8 CTS	Clear to Send to Terminal (Connect between units, but not to the Terminal)
5 SG	Signal Ground (Bidirectional)

DTE CONNECTORS

Table B-2 HSSI DTE Connector Pin Assignments

SIGNAL	DIRECTION	PIN # +SIDE	PIN # - SIDE
SG - Signal Ground	—	1	26
RT - Receive Timing	To DTE	2	27
CA - DCE Available	To DTE	3	28
RD - Receive Data-	To DTE	4	29
Reserved future	To DTE	5	30
ST- Send Timing	To DTE	6	31
SG- Signal Ground	—	7	32
TA-DTE Available	From DTE	8	33
TT- Terminal Timing	From DTE	9	34

Table B-2 HSSI DTE Connector Pin Assignments (Continued)

SIGNAL	DIRECTION	PIN # +SIDE	PIN # - SIDE
LA- Loopback Circuit A	From DTE	10	35
SD- Send Data	From DTE	11	36
LB - Loopback Circuit B	From DTE	12	37
SG- Signal Ground	—	13	38
5 ancillary to DCE	From DTE	14-18	39-43
SG- Signal Ground 5 ancillary from DCE	—	19	44
5 ancillary from DCE	To DTE	20-24	33-49
SG- Signal Ground	—	25	50

Table B-3 DB-25 to V.35 DTE Connector Pin Assignments

TWISTED PAIR	V.35	DB-25
YEL BLK	T R	16 3
BRN BLK	S P	14 2
BLK BLU	E NC	6 NC
WHT RED	H NC	20 NC
RED GRN	K B	18 7
RED YEL	D NC	5 NC

Table B-3 DB-25 to V.35 DTE Connector Pin Assignments

TWISTED PAIR	V.35	DB-25
ORN	F	8
RED	NC	NC
BLK	X	9
RED	V	17
GRN	Y	15
BLK	AA	12
BLU	U	24
RED	W	11
BLU	C	4
GRN	NC	NC
DRAIN	A	

Table B-4 DB-25 to RS-449 DTE Connector Pin Assignments

TWISTED PAIR	RS449	DB25
BLU	17	
RED	35	
BLU	7	4
BLK	25	19
YEL	24	16
BLK	6	3
BRN	22	14
BLK	4	2
BLK	11	6
GRN	18	25
YEL	27	13
RED	8	5
ORN	13	8
RED	31	10
BLK	26	9
RED	8	17
GRN	5	15
BLK	23	12

Table B-4 DB-25 to RS-449 DTE Connector Pin Assignments

TWISTED PAIR	RS449	DB25
BLK	19	7
BLU	NC	NC
DRAIN	1	NC

T1 Network Pin Assignments

The network connector is a DA-15 connector. The assignments for the Network connector are given below.

Table B-5 Network Pin Assignments

PIN	SIGNAL
1	Send towards Network Tip (T1)
9	Send towards Network Ring (R1)
2	Frame Ground
3	Receive from Network Tip (T)
11	Receive from Network Ring (R)
4	Frame Ground
5,6,7,8,10,12,1314,15	Not Connected

DB-25 to DE-9 Adapter Pinouts

An adapter is available from Digital Link that will allow the Digital Link DE-9 ribbon cable to be compatible with a DB-25 connector on the terminal port.

Table B-6 DB-25 to DE-9 Pinouts

DB9	DB25
3	2
2	3
7	4
8	5
6	6

Table B-6 DB-25 to DE-9 Pinouts

DB9	DB25
5	7
1	8
9	23
4	21

External Clock Connector Pin Assignments

A DE-9 connector is provided on the DL3800 rear panel for connection to an External Clock. Pin Assignments for the External Clock connector are as follows:

Table B-7 External Clock Pinouts

PIN	SIGNAL
1	Signal A
2	Signal B
5	Shield
3,4,6,7,8,9	No Connection

Per RS-422 requirements, the receiver has an input sensitivity of 200 mV over the input voltage range of ±7 V. The frequency is 1.544 MHz ± 50 ppm, and the impedance is 10 kΩ.

DTE Clock Rates

Table B-8 DTE Clock Rates

NETWORKS		DTE CLOCK RATE, MBPS
B8ZS	1	1.528
	2	3.056
	3	4.584
	4	6.112
	5	7.640
	6	9.168
	7	10.696
	8	12.224
AMI	1	1.336
	2	2.672
	3	4.008
	4	5.344
	5	6.680
	6	8.016
	7	9.352
	8	10.688

C Factory Default Settings

Table C-1 Unit Settings

Unit	Setting
ALARM ENABLE	Disabled
AUTOMATIC BACKUP	5 minutes after each database change
FRONT PANEL	On
UNIT NUMBER	0
TERMINAL BAUD RATE	9600
TERMINAL PARITY & BITS	8 bits, No parity
TERMINAL STOP BITS	2
XON/XOFF	Enabled
MULTIDROP	Enabled

Table C-2 DTE Settings

DTE	Setting
DTE INTERFACE	V.35
CLOCK	SCTE
TX CLOCK	Normal
RX DLOCK	Normal
RLSD MODE	Automatic
DSR MODE	Automatic
CTS MODE	Automatic
TM MODE	Automatic
DTE LOSS DETECTION	RTS

Table C-3 Network Settings

Network	Setting
ALARM	Mask
ACTIVE/RESTORE MODE	Never Use
FRAME	ESF
LINECODE	B8ZS
EQUALIZATION	0'-132"
FDL	Enabled
SET/RESET	Enabled
PRIMARY CLOCK SOURCE	Xmt Int. Rcv Net 1
SECONDARY CLOCK SOURCE	Xmt Int. Rcv Net 2
DSU MODE	Inverse Mux (Standard Operation)
SUPPRESS YELLOW DET	Disabled

Table C-4 Network Threshold Settings

Network Threshold	Setting
CONSECUTIVE THRESHOLDS	Fallback Disabled, Seconds 10
INTERVAL THRESHOLDS (15 MIN)	Fallback Disabled
Seconds	Major 100 Minor 100
INTERVAL THRESHOLDS (24 HR)	Fallback Disabled
Seconds	Major 10 Minor 10

Table C-5 SNMP Configuration Settings

SNMP Configuration	Setting
ALL ADDRESSES	0.000.000.000
READ COMMUNITY STRING	Public

Table C-5 SNMP Configuration Settings

SNMP Configuration	Setting
WRITE COMMUNITY STRING	Public
TRAP COMMUNITY STRING	Public
SNMP BAUD RATE	9600
BITS & PARITY	8 bits, No parity
STOP BITS	2

Table C-6 Test Settings

Tests	Setting
ALL LOOPBACKS & TESTS	Off

G Glossary

ABAM

A designation for 22 gauge, 110 ohm, plastic insulated, twisted pair Western Electric cable normally used in central offices.

AIS (Alarm Indication Signal)

An unframed sequence of All Ones normally sent by a DSU/CSU that cannot maintain the required pulse density in AMI mode or sent by a CSU that has a loss of signal condition on its data port. The signal is sent to maintain continuity of transmission and to notify the far-end that a transmission fault exists on the line. Same as Blue Alarm.

alternate loop code

Used to invert loop codes from U.S. standard code; inverts zeros to ones and ones to zeros.

AMI (Alternate Mark Inversion)

A line code in which the signal carrying the binary value alternates between positive and negative polarities.

ANSI (American National Standards Institute)

Coordinates the development of U.S. voluntary national standards in both the private and public sectors. Standards pertain to programming languages, EDI, telecommunications and physical properties of diskettes, cartridges and magnetic tapes.

ASCII (American National Standard Code)

The standard and predominant seven-bit (eight bits with parity) character code used for data communications and data processing.

asynchronous transmission

Transmission not related to a specific frequency, or to the timing of the transmission facility.

attenuation

Reduction or loss of signal strength, measured in decibels; opposite of gain.

B

B8ZS (Bipolar 8 Zero Substitution)

A technique used to accommodate the ones density requirements of T1 transmission.

bandwidth

The data-carrying capacity of a transmission medium, usually measured in Hertz (Hz), which equals cycles per second.

baud

A measurement of the signaling speed of a data transmission device.

BER

See bit error rate.

BES (Bursty Errored Seconds)

Occurs when a second has 320 or more CRC violations. (ESF format only)

bipolar

The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities. Zero and one values are represented by the signal amplitude at either polarity, while no value "spaces" are at zero amplitude.

bit error

Occurs when the value of an encoded bit is changed in transmission, and interpreted incorrectly by the receiver.

Bit Error Rate (BER)

The percentage of received bits that are in error, relative to a specific amount of bits received; usually expressed as a number referenced to a power of 10.

bps

Bits per second; the basic unit of measure for serial data transmission capacity; Kbits (kilobits) for thousands of bits per second; Mbitps (megabits) for millions of bits per second, and Gbits (gigabits) for billions of bits per second.

Blue Alarm

An unframed sequence of All Ones normally sent by a DSU/CSU that cannot maintain the required pulse density in AMI mode or sent by a CSU that has a loss of signal condition on its data port. The signal is sent to maintain continuity of transmission and to notify the far-end that a transmission fault exists on the line. Same as Alarm Indication Signal (AIS).

broadband

Services or interfaces that operate above the T1 data rate, typically at NxT1, T3, SONET, or ATM speeds.

BPV (Bi Polar Violation)

Occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

C

CCITT

International Telegraph and Telephone Consultative Committee.

central office (CO)

The phone company switching facility or center; usually a Class 5 end office, at which subscribers' local loops terminate.

channel

A physical or logical path allowing the transmission of information; the path connecting a data source and receiver.

circuit

Generally referring to a transmission medium connecting two or more electronic devices.

clear channel

A characteristic of a transmission path or digital circuit in which the full bandwidth is available to the user. The phone company does not use any portion of the bandwidth for framing or control bits.

clock

An oscillator-generated signal providing a timing reference for a transmission link; used to control timing functions such as sampling interval, signaling rate and duration of signal elements.

code conversion

The process of changing the bit grouping for a character in one code into the corresponding bit grouping for the character in another.

CMI (Control Mode Idle)

The process of changing the grouping for a character in one code into the corresponding bit grouping for the character in another.

communications port (Comm Port)

The electrical interface between a unit and the operator’s terminal. Operator commands and responses can be communicated through the Comm Port.

connector

A physical interface, such as DB-15 or RS-232-C, typically with male or female components.

CPE (Customer Premises Equipment)

Equipment that interfaces the telephone network and physically resides at the user's location.

CRC (Cyclic Redundancy Check)

An error checking scheme used to check the received data. The CRC bits within the framing are calculated using the contents of the frame. The calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremental. Performance checking is done by both the carrier and the customer without causing any interference with the T-1 traffic.

CSU (Channel Service Unit)

The CPE used to terminate a digital circuit at the customer site. The CSU performs certain line-conditioning functions, ensures network compliance to FCC rules and responds to loopback commands. It ensures proper ones density in the bit stream and performs bipolar violation correction. The DSU and CSU are often in the same unit.

CTS (Clear to Send)

A signal issued by the DSU to indicate it is connected to the digital network and is ready to accept data.

CV (Code Violation)

Any code violation.

D

D4

Framing format for T1 transmission that places 12 T1 frames into a superframe. In ESF (a newer framing format) frames consist of 24 bits instead of the previous standard 12 bits as in D4 format.

DACS (Digital Access Cross-Connect Switch)

A digital switching device for routing and switching T1 lines and DS-0 portions of lines among multiple T1 ports. DACS performs all the functions of a normal switch, except that connections are typically set up in advance of a call, not together with a call, as in most, normal low-bandwidth communications systems (e.g. voice-band voice and data). A DACS is in essence a manual T-1 switch.

data link

Any serial data communication transmission path, generally between two adjacent nodes or devices and without any intermediate switching nodes.

data link layer

In the OSI model, the network processing entity that establishes, maintains and releases data link connections between adjacent elements in the network.

DCE (Data Circuit-Terminating Equipment)

Equipment that is either a part of the network, an access point to the network, a network node, or equipment at which a network circuit terminates.

dial-up

Describing the process of, or the equipment or facilities involved in, establishing a temporary connection via the switched telephone network.

digital loopback

A technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit. The device being tested returns a received test message, the results of which are compared to the original message.

DS-0 (Digital Signal Level 0)

A 64kbit/s standard digital telecommunications signal or channel.

DS-1 (Digital Signal Level 1)

The 1.544Mbit/s digital signal carried on a T1 facility.

DS-3 (Digital Signal Level 3)

The 44.736Mbit/s digital signal carried on a T3 facility.

DSU/CSU (Data Service Unit/Channel Service Units)

The pair of communications devices that connect an in-house line to an external digital circuit. At the customer's end of the telephone connection, the DSU/CSU takes data from terminals and computers, encodes it, and transmits it down the link. At the receive end, another DSU/CSU equalizes the received signal, filters it, and decodes it for interpretation by the end-user.

DSU (Data Service Unit)

A device designed to connect a DTE to a digital phone line. The DSU transmits and receives the signal and provides buffering and flow control. The DSU and CSU are often in the same unit. Also called a Digital Service Unit.

DSR (Data Set Ready)

A data port signal.

DSU Loopback

A DSU loopback is intended to include as much of the customer data communications circuitry in the looped-back path as possible. The signal passes from the remote unit into the local unit as far as the DSU. This test loops the received network signal back to the network.

DSU/CSU (Data Service Unit/Channel Service Units)
The pair of communications devices that connect an in-house line to an external digital circuit. At the customer's end of the telephone connection, the DSU/CSU takes data from terminals and computers, encodes it, and transmits it down the link. At the receive end, another DSU/CSU equalizes the received signal, filters it, and decodes it for interpretation by the end-user.

DSX-1 (Digital Signal Cross Connect Level 1)
Parameters set used when DS-1 signals are cross connected.

DTE (Data Terminal Equipment)
Terminal equipment connected to the DSU and used for communication over digital networks. May be a terminal, computer, printer or multiplexer.

DTE loopback
An EIA-232-D signal which indicates that the DTE is ready for operation.

DTR (Data Terminal Ready)
Signal from DTE to DSU/CSU.

E

EER (Excessive Error Rate)
Determined by counting the number of T1/T3 code violations during a time interval.

EFS (Error Free Seconds)
Occurs when a second is free of CRC-6 violations or Out of Frame (OOF) events or one or more BPV or OOF events.

EIA (Electronic Industries Association)
An organization which sets data communication industry standards.

encoding/decoding
The process of reformatting information into a format suitable for transmission, and then recovering it after transmission.

equalization
The spacing and operation of amplifiers so that the gain provided by the amplifier, per transmission frequency, coincides with the signal loss at the same frequency; circuitry that compensates for the differences in attenuation at different frequencies.

ES (Errored Second)
Occurs when a second has one or more OOF events or CRC violations or with one or more BPV or OOF events.

ESF (Extended Superframe Format)
A new T1 framing standard used in Wide Area Networks (WANs). With this format 24 frames, instead of 12 are grouped together. ESF provides frame synchronization, cyclic redundancy checking and data link bits in overhead. It allows more information to be stored and retrieved easily, facilitating network performance monitoring and maintenance.

F

failed signal state
Occurs when ten consecutive severely errored seconds are detected.

far end
The unit or units remote from the user.

FE (Framing Errors)
Occurs when the end of a frame is not detected where it should be.

FDL (Facility Data Link)
A four Kbps data channel provided by 12 of the 24 ESF framing bits. It is used by the carrier to request reports, clear error counters and activate loop backs.

FG (Frame Ground)
A signal from DTE to DSU/CSU.

fractional bandwidth DTE loopback
A loopback test that loops back the signal at the network interface. See also loopback.

Fractional T1
A service that provides less than full T1 capacity (one or more 64 Kbps channels are provided).

frame
A group of bits sent serially over a communications channel. The basic data transmission unit employed with bit oriented protocols.

frame relay
A high-speed packet switching protocol used for wide area networks (WANs); faster than traditional X.25 networks, because it was designed for today's reliable circuits and performs less rigorous error detection. Frame relay networks use bandwidth only when there is traffic to send. Frame relay does not support voice.

framing
A technique which separates incoming bits into identifiable groups to enable the receiving device to recognize and reconstruct them.

frame ground

A metallic layer acting as a shield, consisting of tape, braid, wire or sheath and surrounding insulated conductors in cable. It may be the metallic sheath of the cable or the metallic layer inside a nonmetallic sheath. It reduces stray electrical fields, prevents outside electrical interference, drains off current induced by lightning and provides for safety of personnel.

frequency

The number of repetitions per unit time of a complete waveform. The number of complete cycles per unit of time, usually expressed in Hz.

full bandwidth DTE loopback

A loopback test that loops back the signal at the multiplexer. See also **loopback.**

H

HDLC (High Level Data Link Control)

Bit-oriented, data-link control protocol; any related control of data links by specified series of bits, rather than by control characters.

I

IP address

A unique, 32-bit identifier for a TCP/IP host on a network. IP addresses are normally printed in dotted decimal form, such as

L

LBO (Line Build Out)

An adjustable value used to tune the attenuation between the DSU/CSU card and the last repeater on the T1 circuit.

LED (Light emitting diode)

A device that accepts electrical signals and converts the energy to a light signal.

LOF (Loss of Frame)

Occurs when a received digital signal loses frame synchronization.

LOFC (Loss of Frame Count)

A count of declared Loss of Frame events (ESF framing only).

loopback

A diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. This allows a technician (or built-in diagnostic circuit) to compare the returned signal with the transmitted signal and get some sense of what's wrong.

LOS (Loss of Signal)
Occurs when an input signal is detected as all zeros for 176 bit times.

loss
A reduction in signal strength, expressed in decibels.

LSC (Loopback Select Code)
An indicator describing a DSU loopback characteristic. LSC is a minimum of 35 LSC bytes of S11101F1 with secondary channel.

LT (Local Test)
A data port signal to DSU/CSU.

M

mask
Refer to subnet mask.

MIB (Management Information Base)
A structure that defines what is obtainable from a network device and what can be controlled. It has a directory listing the logical names of all information resources residing in the network and pertinent to the network's management. It is used to describe network management variables.

multiplexer
Any device that allows two or more users to share a common physical transmission medium. Employed in pairs, where each device performs both multiplexing of the multiple user inputs and demultiplexing of the channel back into the separate user data streams.

multiplexing
The combining of multiple data channels onto a single transmission medium. Typically, data streams are interleaved on a bit or byte basis (time division) or separated by different carrier frequencies (frequency division).

multidrop
A communications arrangement where multiple devices share a common transmission channel, though only one may transmit at a time.

N

NEBS
A network Equipment Building Systems requirement. A standard issued by Bellcore that spells out central office standards for grounding, cabling and power.

network

An interconnection of computer systems, terminals, or data communications facilities.

NI (Network Interface)

The point of demarcation between the customer premises and the carrier's network, usually drawn at the network connector on the rear panel of the Digital Link access device.

NRZ (Non-Return to Zero)

A binary encoding and transmission scheme where “ones” and “zeros” are represented by opposite, and alternating, high and low voltages.

NRZI (Non-Return to Zero Inverted)

A binary encoding technique that inverts the signal on a “one” and leaves the signal unchanged for a “zero,” where a change in voltage state signals a “one” bit and the absence of a change denotes a “zero” bit value.

O

OOS (Out of Service)

A digital network trouble signal.

OOF (Out of Frame)

An error checking scheme. An OOF occurs when two out of four consecutive framing bits are in error.

P

parity bit

An additional, non-informational bit appended to a group of bits indicating that the number of “ones” in the bits group is odd or even.

parity check

A process of error checking using the parity bit.

polarity

Any condition where there are two opposing charges, such as positive and negative.

port

The physical point of access into a computer, network or other electronic device.

protocol

A formal set of rules governing the format, timing, sequencing and error control of exchanged messages on a data network.

R

RD (Receive Data)
A data port signal.

receiver
The receiver synchronizes the framing pattern, separates the frame bits from the payload data and monitors for frame errors in 64 kbps mode. It achieves frame synchronization within 5 milliseconds.

repeater
Equipment that receives a pulse train, amplifies it, retimes it, and then reconstructs the signal for retransmission.

return to zero
Method of transmitting binary information such that, after each encode bit, voltage returns to the zero level.

RI (Ring Indicator)
A data port signal.

RJ48S
An 8-position keyed jack used to connect services that are covered under FCC Part 68 Rules, such as public switched digital service (PSDS), switched 56, 19.2 Kbps service, 64 Kbps service, and synchronous digital data with secondary channel.

RLSD
Receive Line Signal Detect, a data port signal

RS232
A TIA/EIA standard for serial transmission.

RS232-C
An EIA specified physical interface, with associated electrical signaling, between data circuit terminating equipment (DCE) and data terminating equipment (DTE).

RS449
A common 37-position interface for data terminal equipment and data circuit terminating equipment employing serial binary data interchange. It is a balanced interface, based on unipolar digital signals, depending more on current flow than voltage, therefore supports greater distances than the RS-232 interface.

RTS (Request to Send)
A signal sent by DTE to DSU/CSU indicating DTE has data ready to transmit.

S

SCR (Serial Clock Receive)
A unipolar clock from the DCE signal. A data port signal.

SCT (Serial Clock Transmit)
A unipolar clock from the DCE signal. A data port signal.

SCTE (Serial Clock Transmit External)
The clock signal is echoed from the DTE for the purpose of timing incoming data on long cable runs.

scrambler
A device or software program that encodes data for encryption. It distorts a voice or data conversation so that only another like device can figure out the content of the message.

SD (Send Data)
A signal from DTE to DSU/CSU.

secondary channel
A subchannel derived from the main channel. It does not carry data messages and is used for diagnostic or supervisory purposes.

serial transmission
A sequential transmission of bits constituting an entity of data over a data circuit.

SES (Severely Errored Second)
A second during which 320 or more CRC violations or OOF events have occurred (ESF framing only).

SG (Signal Ground)
A signal from DTE to DSU/CSU.

simplex current
One way transmission used by Telco to provide power to repeaters.

SLIP (Serial Line IP)
A TCP/IP protocol that allows IP packets to be transmitted over a serial link, such as a dial-up or private telephone line.

SMDS (Switched Multimegabit Data Service)
A fast-packet technology based on the connection-less data networking capability described in the IEEE 802.6 specification. The data format for SMDS is "cell oriented." SMDS does not support voice.

SNMP (Simple Network Management Protocol)

A widely-used network monitoring and control protocol. Data is passed from SNMP agents (hardware and/or software processes reporting activity in each network device, hub, router, bridge, etc.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a structure that defines what is obtainable from the device and what can be controlled.

stop bit

The last transmitted element in each character, which permits the receiver to come to an idle condition before accepting another character.

subnet mask

The number of bits in an IP address used for the subnet address.

synchronous transmission

Data communications in which characters or bits are sent at a fixed rate and the transmitting and receiving devices are synchronized.

T

T1

A digital carrier facility used to transmit a DS-1 formatted digital signal at 1.544 Mbps. T-1 normally can handle 24 voice conversations, each one digitized at 64kbps. But, with more advanced digital voice encoding techniques, it can handle more voice channels. T-1 is a standard for digital transmission in North America. T-1 lines are used for connecting networks across remote distances.

T3

A digital carrier facility used to transmit a DS-3 formatted digital signal at 44.736 Mbps.

T-Carrier

A time-division, multiplexed digital transmission facility, usually operating at an aggregate data rate of 1.544 Mbps.

telnet

A remote terminal application that enables the user to log on to a remote computer on the same IP network. The user can work from the PC as if it were a terminal attached by a hard-wired line to the remote computer. The application uses the *Telnet* Internet protocol.

transmitter

In 64K mode, the transmitter inserts the frame bit, with a fixed pattern of 101100.

TRAP

A mechanism by which a device automatically sends an alarm for certain network events to a management station. The management station can initiate a polling sequence to the device to determine the cause of the problem.

U

UAS (Unavailable Seconds)

Number of seconds elapsed after 10 consecutive SES events are received (ESF framing only).

V

V.35

A CCITT standard for the trunk interface between a network access device and a packet network. It defines signaling for data rates greater than 19.2 Kbps.

V.52

Terminal emulation standard. CCITT standard (1976) for various loopback tests that can be incorporated into modems for testing the telephone circuit and isolating transmission problems. Operating modes include local and remote digital loopback and local and remote analog loopback.

V.54

A CCITT standard for loop test devices in modems. It defines local and remote loopbacks.